

MILITARY OPERATIONS RESEARCH SOCIETY



*Joint Analysis: QDR 2001 and Beyond
Mini-Symposium
1-3 February 2000*

Co-Chairs
Michael Leonard
James Bexfield, FS

UNCLASSIFIED
Approved for Public Release

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The Military Operations Research Society (MORS)

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Preface

On 1-3 February 2000, MORS Sponsored a Mini-Symposium titled, *Joint Analyses: QDR 2001 and Beyond* at the Booz-Allen Hamilton facilities in Fairfax, Virginia. The purpose of the Mini-Symposium was to (1) examine DoD assessment capabilities for performing QDR 2001, (2) provide a non-confrontational environment in which OSD, the Joint Staff, Defense Agencies, Unified Commands, and the Services could discuss analytical plans and preparations for QDR 2001, (3) provide ideas and analytical status to OSD/JCS decision makers that are planning and structuring QDR 2001, and (4) identify other activities that could help joint analysis in the 21st century.

This report contains four parts. Part I is the Executive Summary which includes the *PHALANX* article summarizing the result of the Mini-Symposium and the briefing given in June at the annual MORS Symposium. Part II is the report from the Synthesis Group. Part III contains the slides used by the speakers in the Plenary Sessions if they were available and approved for public release. Finally, Part IV contains the reports from the working groups/subgroups. There are four Appendices: (A) The Terms of Reference, (B) List of Attendees, (C) Biographies of the Plenary Speakers, and (D) Acronym List.

This meeting would not have been possible without the excellent support of the MORS staff: Dick Wiles (Executive Vice President), Natalie Addison (Vice President for Administration), Cynthia Kee LaFreniere (Assistant Administrator), Corrina Ross-Witkowski (Communications Manager) and Jarvey Nelson (Communications Assistant). In addition, MORS gives a special thanks to Booz-Allen and Hamilton for the use of their Conference Center and the excellent support provided by Bob Statz and Mark Levy who coordinated the assistance of several others.

Mr. James N. Bexfield, FS

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Editor's Note: The following presentations were presented at the Mini-symposium but were not cleared for publication in this document.

Feature Presentations

JWARS

Dr. Jim Metzger (JWARS Program Manager)

Joint Data Support

Ms. Elaine Simmons (JDS Program Manager)

Collaborative Analysis

Lt Col Kirk Yost (JCS-J8)

DARPA Presentations

Tactical Technology

Dr. David Whelan (Director, Tactical Technology Office)

Special Projects

Dr. Amy Alving (Deputy Director, Special Projects Office)

Executive Summary

Introduction

The *Joint Analysis: QDR 2001 and Beyond* special meeting was held 1-3 February 2000 in the conference facilities at Booz, Allen & Hamilton in McLean, Virginia. Mike Leonard chaired, with Jim Bexfield, FS, serving as co-chair. The meeting was the first formal activity by the MORS community in support of the second Quadrennial Defense Review (QDR), which will occur in 2001. This QDR will include a comprehensive examination of the defense strategy, force structure, force modernization plans and infrastructure and budget plans with a view into the 21st century.

This mini-symposium resulted from a recommendation made at the 7-9 April 1998 MORS special meeting titled *QDR Analysis: Lessons Learned and Future Directions*. The specific suggestion was that MORS provide another opportunity prior to the next QDR during which the Office of the Secretary of Defense (OSD), the Joint Chiefs of Staff (JCS) and the Services could provide updates on their preparations and plans. The associated working groups would be tasked to identify potential deficiencies and suggest remedies that could be implemented before the beginning of the legislated QDR activities in 2001.

Purpose

The purpose of the meeting was to help the Department of Defense (DoD) prepare for the 2001 QDR and other major joint analytic activities in the 21st century. More specifically, the event provided a non-confrontational environment in which OSD, the Joint Staff, Defense agencies, Unified Commands and the Services could discuss analytical plans and preparations for QDR 2001. The end products were ideas and an assessment of the analytical capabilities that OSD/JCS can use in planning for and structuring QDR 2001 and other activities related to joint analysis. Focus areas included analytical tools, data collection and analyst/decision maker interactions.

Structure

The first day consisted of plenary sessions. On the second and third days, each participant was assigned to one of nine groups, with each group focusing on a particular analysis area.

The first morning was devoted to the current plans and perspectives of the OSD and Congress. Threat and environmental issues were addressed by providing the results of the first phase effort

of the US Commission on National Security in the 21st Century (USCNS-21, often called the Hart-Rudman Commission). Speakers included:

- Congress: Mr. Chris Jehn, CBO
- Environment: ADM Harry Train, Ret., USCNS-21
- Policy: Mr. Andy Hoehn, OSD/S&TR
- Analysis, J-8 perspective: Mr. Vince Roske, JCS/J-8
- Analysis, PA&E perspective: Mr. Jim Johnson, OSD/PA&E.

Dr. David Chu of RAND, the panel chair, then invited the speakers to join him in a discussion.

Immediately after lunch Ms. Michele Flournoy presented her view of the process and analytical challenges posed by QDR 2001. This was followed by presentations by the Services on their perspectives, culminating in a Service panel chaired by General Larry Welch, USAF, Ret., IDA. The Service presenters were:

- Navy: Mr. Bruce Powers
- Marines: LtGen John Rhodes
- Air Force: LtGen William Begert
- Army: MG Robert St. Onge

LTC Charles Bruce, JCS/J-8, gave the final presentation on day one describing the Dynamic Commitment (DC) process and the plans for using it to support QDR 2001.

Five additional feature presentations occurred during days two and three. The second day's Plenary Session consisted of a Joint Warfare System (JWARS) update by Dr. Jim Metzger, an overview of the Joint Data Support (JDS) activity by Ms. Elaine Simmons, and an overview of a recent attempt to do collaborative analysis in the Capabilities-Based Munitions Review (CBMR) by Lt Col Kirk Yost, JCS/J-8. The third day's Plenary Session included presentations by two senior Defense Advanced Research Projects Agency (DARPA) officials: an overview of the Tactical Technology Program by Dr. David Whelan and an overview of the Special Projects Program by Dr. Amy Alving.

The remainder of the second and third days consisted of working group and subgroup meetings organized around the Shape, Respond and Prepare components of the National Security Strategy

(NSS). The chairs and co-chairs of these groups (with affiliation at the time of the meeting) were:

Integration Working Group

Dr. Robin Buckelew, Center for Land Warfare (Chair)

Dr. Paul Davis, RAND (Co-Chair)

Shape Working Group

Dr. David Perrin, CNA (Chair)

Dr. George Akst, MCCDC (Co-Chair)

Engagement/Overseas Presence Subgroup

Mr. Dean Free, N81 (Chair)

LCDR John Ruck, N81 (Co-Chair)

Small Scale Contingencies And OOTW Subgroup

COL Forrest Crain, DMSO (Chair)

Mr. Dean Hartley, ORNL (Co-Chair)

Respond Working Group

COL Bob Clemence, JSC/J-8 (Chair)

Combat Operations Subgroup

COL Andy Loerch, CAA (Chair)

Col Rich Handley, AFSAA (Co-Chair)

Information Operations Subgroup

Mr. Steve Myers, JHU/APL (Chair)

Dr. Bill Kemple, NPS (Co-Chair)

Asymmetric Challenges Subgroup

LTC Jerry Glasow, DUSA(OR) (Chair)

LTC Bruce Bowman, J-8 (Co-Chair)

Readiness Subgroup

Dr. Laura Junor (CNA) (Chair)

Ms. Teresa Coady, OSD/RP&A (Co-Chair)

Prepare Working Group

Dr. Jackie Henningsen, FS, AF/XOC (Chair)

Mr. Vern Bettencourt, FS, HQDA, DCS OPS (Co-Chair)

Force Modernization Subgroup

Mr. Eric Coulter, OSD/PA&E (Chair)

Dr. George Koleszar, IDA (Co-Chair)

Infrastructure Subgroup

Dr. Sam Kleinman, CNA (Chair)

Dr. Frank Camm, RAND (Co-Chair)

Synthesis Group

Dr. Stu Starr, FS, MITRE (Chair)

Plenary Session Results

Most speakers provided background on their organization's preparations for QDR 2001, to include what has changed over the past few years, how analysis can help, and the key challenges facing joint analysis. General comments included:

Changing Environment

Homeland Defense. Most speakers expect the DoD to increase its emphasis on home defense. They also expressed concern about asymmetric threats to include catastrophic terrorism.

Overseas Bases. Because the speakers expected decreasing access to overseas bases, they projected an increasing importance to air and sealift and forward positioned naval forces.

Information Availability. Access to information will be critical in the resolution of conflicts.

Analysis Needs

Start Now. Several speakers stressed the need to identify analysis and data needs early and to begin to conduct necessary supporting studies now.

Risk Measurement. The preferred force structure should minimize "risk" over a wide range of scenarios (MTWs, SSCs, etc.).

Collaborative Approach. Several speakers urged the DoD to design an integrated and open approach that involves OSD, JCS and the Services.

Better Analytical Tools. Among other things, the speakers emphasized the need for better methods to analyze the impact of OPTEMPO as well as to perform "effects based" analysis to include measuring the value of strategic interdiction and C4ISR.

Broad-Based. Some suggested the need for other federal organizations to be included in QDR 2001 (e.g. FEMA, Department of Energy, State Department).

Allied Contributions. The appropriate amount of allied/coalition contributions should be included in the analyses.

Expectations

QDR Emphasis. Most speakers expect the QDR to be strategy based but resource constrained.

Force Transformation. Many speakers felt that their organizations and the environment are more receptive to transforming the force than they have been in the past. All of the Services are engaged in some form of force transformation.

Modernization Bow Wave. There was a sense that one major focus of the QDR should be on how to fund the modernization bow wave.

Analytical Challenges

Decision Support Tools. Several speakers suggested that the DoD make better use of decision support tools to track the progress of the QDR; to include, the implementation of new policies. These tools can also facilitate integration and final decision making.

Analytic Game Plan. Michele Flournoy challenged the DoD to develop an analytic game plan that will be compelling to the next Administration. Figure 1 contains an example.

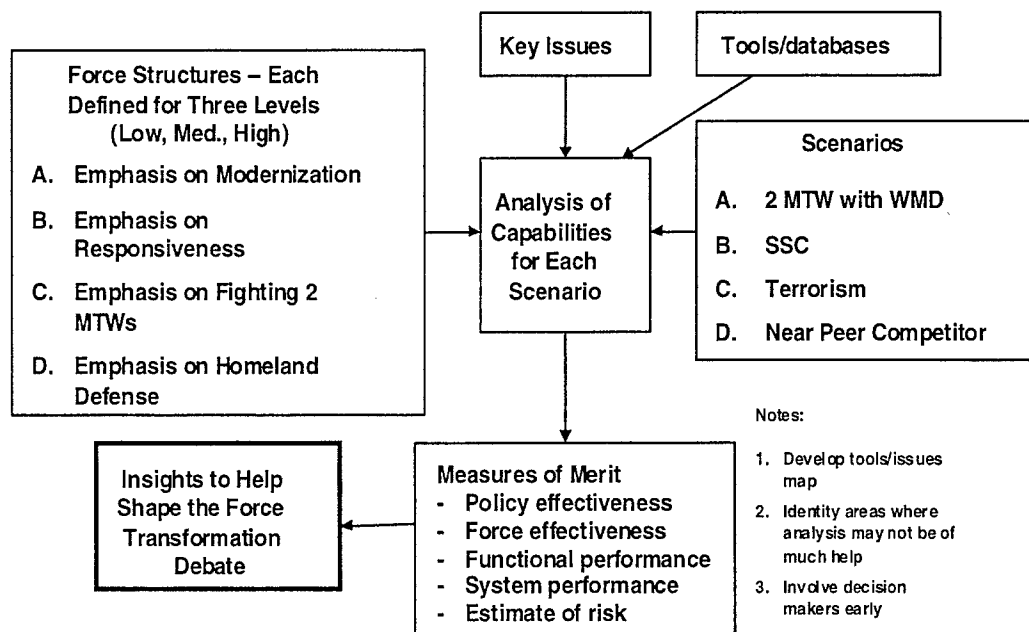


Figure 1. Elements of QDR Analysis Plan

Working Group Findings

Each Working Group/Subgroup (WG/SG) and the Synthesis Group produced a briefing that summarized their findings. These individual briefings, along with most of the plenary briefings, will be contained in the Mini-Symposium Proceedings available through the MORS office and/or on its web site (<http://www.mors.org>). This section integrates the individual working group reports into general findings for the workshop report.

General Recommendations. Some of the working group recommendations paralleled those of the plenary sessions. Some of the more important items were:

- Use an open transparent process that could use classified and unclassified Web sites to share information.
- Prepare an analytic game plan.
- Develop better methods for measuring risk.
- Use decision support packages to:
 - Provide feedback loops to help analysis influence change.
 - Share results of supporting QDR studies and deliberations by summarizing them on a web page.

In addition, the working groups encouraged:

- Establishing a process that will help build a strong analyst/decision maker relationship, one where the analyst would better understand the issues and decision makers would know better what to expect from analysis.
- Early OSD/JCS guidance with regard to scenarios/timeframe and issues/decision space.
- Specifying a standard measures of merit set for use in the QDR.
- Establishing a process to facilitate the consistency of QDR decisions with the JV 2015 visions.

Ongoing Activities. The full list of activities is contained in the final report for each WG/SG. Some of the larger activities include: JV 2015, Dynamic Commitment (DC), the Joint Strategy Review (JSR), Bosnia/Kosovo lessons learned, readiness monitoring, several on-going analyses of alternatives and base closure and competition/outourcing studies.

Analytical Challenges. Each WG/SG presented a list of analytical challenges they felt needed to be addressed in future joint analysis and, if possible, during QDR 2001. Some of the more general challenges are listed below.

INTEGRATION

- Increase the use of risk/uncertainty assessing methodologies (e.g., exploratory analysis, portfolio methods).
- Develop single-mission “models” for special situations (e.g., inventory models to track resources for sequences of SSCs/NEOs).

SHAPE

- Develop better methods to measure the effectiveness of deterrence and engagement.
- Perform first order cost-benefit analyses of shaping activities.
- Balance low-risk but high-frequency operations with high-risk, low-frequency operations.
- Develop better measures of success for SSC/OOTW missions.
- Assess the force structure needed to support presence/engagement/SSC/OOTW missions.
- Increase the robustness of the scenario set explored via Dynamic Commitment (DC).

RESPOND

- Theater Level:
 - Develop better representations of maritime operations.
 - Improve chemical/biological threat and response representations.
 - Create COSAGE ground combat inputs for newer scenarios.
 - Degrade performance in campaign models due to readiness shortfalls (manning, spares, training).
- Information Operations:
 - Provide better representation of the interaction between IW/IO and conventional forces.
 - Model network-centric and effects-based operations.
 - Include non-DoD agencies and their effects and capabilities in these analyses.
- Asymmetric Threats:
 - Provide better modeling of non-WMD threats (terrorism, mines, political manipulation).
 - Include asymmetric threats in a wider range of scenarios (e.g., SSCs).
- Readiness:
 - Develop analysis capabilities that will efficiently allocate resources so as to maximize readiness.
 - Quantify the effect of engagement/presence on PERSTEMPO/OPTEMPO.

- Articulate the degree of readiness needed to perform full-spectrum responses under various initial conditions (MTW, SSC, homeland defense, etc.)

PREPARE

- Modernization:
 - Improve methods to demonstrate the military worth of modernization initiatives.
 - Adapt analysis tools/data to reflect new technologies, system capabilities, tactics, etc.
 - Identify and perform trades among functional areas (e.g., platforms versus munitions, sensors versus shooters).
- Infrastructure:
 - Develop methods to link infrastructure to mission effectiveness.
 - Develop methods to measure the impact of infrastructure changes on organizational behavior.
 - Improve individual behavior analysis in areas such as compensation, rewards for innovation, etc.

Campaign Modeling. Campaign modeling will play a key role in QDR 2001, especially in the area of force structure analysis. Due to the increasing complexity of warfare, many involved in the 1997 QDR felt new campaign analysis tools were needed. One result was increased support for the JWARS campaign model development effort, the largest constructive model development ever undertaken by the DoD. While considerable progress has been made in the development of JWARS, meeting participants felt that it would not be sufficiently mature to replace the legacy models by the start of QDR 2001, especially considering the need to train analysts in its use and to collect the needed data. Still, JWARS should help support the QDR in several key areas to include:

- Integration of logistics and the warfight
- Value of C4ISR systems
- Ship to shore.

On the positive side, the legacy campaign model suite has improved over the past few years. Examples cited at the meeting include:

- TACWAR (Strengths: Joint Use and Ground War) has increased its ability to represent Weapons of Mass Destruction (WMD) (especially chemical warfare) and C2.

- Thunder (Strengths: Air War and Space) has improved in the areas of Space systems and ISR.
- GCAM (Strengths: Naval Forces and Logistics) has enhanced its ability to model land maneuver and ground combat attrition.

The sense of the meeting was that a suite of models, appropriately tailored for the major issues, could best accomplish campaign analysis for QDR 2001.

Data. Several WG/SGs suggested that actions must be taken to improve the quality of data in several areas to include readiness, infrastructure, IO/IW, perception-based decision making for C4ISR constructs, and the impact of chemical and biological weapons on the warfight. There was strong support for the Joint Data Support (JDS) activities as they develop database structures that contain standard templates and identify data origins. In addition, there was support for using the MRS-05 database as the starting point for QDR 2001.

21st Century Analysis. Several suggestions were made concerning how to improve future analyses that are beyond the scope of QDR 2001. Three of the more significant suggestions include:

- Develop methods to include the insights and data from Joint and Service experimentation in future analysis.
- Establish a recurring joint analysis program, with a two-year frequency, to perform a budget year and end-of-POM assessment of warfighting risk.
- Use quantitative methods to inform the writing of the Illustrative Planning Scenarios (IPS).

How MORS Can Help. The WG/SGs suggested three new initiatives for MORS:

- Sponsor a workshop on defining and measuring risk in the fall of 2000.
- Add an asymmetric threat-working group to the MORS Symposium and hold an asymmetric mini-symposium.
- Create a web-based library with appropriate links to organizations and documents
 - Tools/models.
 - Publications.

Summary

In conclusion, the major recommendations of the mini-symposium for the QDR were to:

- Establish an open collaborative analysis environment.
- Develop an analytic game plan that the new Administration will want to use.
- Develop better ways of measuring risk (Fall MORS Workshop?).
- Use decision support tools to help manage QDR.
- Include non-DoD agencies.
- Improve the quality of data, especially in the areas of readiness, infrastructure, IO/TW, perception-based decision making and chemical/biological weapon effects.

With regard to analysis beyond QDR 2001, the participants supported the continued development of JWARS, the JDS concept, and encouraged greater use of data from Joint and Service experimentation.

JOINT ANALYSIS: QDR 2001 AND BEYOND

Military Operations Research Society Mini-Symposium/Workshop

Chair: Mr. Mike Leonard, Institute for Defense Analyses

Co-Chair: Mr. Jim Bexfield, FS, Institute for Defense Analyses

**February 1-3, 2000
Booz-Allen & Hamilton
McLean, VA**

OUTLINE

- **Introduction**
- **Plenary session perspectives**
- **Synthesis of working group reports**
- **Summary**

PURPOSE

- **General**
 - Examine DoD capabilities for performing QDR 2001.
 - Provide a non confrontational environment in which OSD, the Joint Staff, Defense Agencies, Unified Commands, and the Services can discuss analytical plans and preparations for QDR 2001.
 - Provide ideas and analytical status to OSD/JCS decision makers planning and structuring QDR 2001.
 - Identify other activities that can help joint analysis in the 21st century.
- **Focus areas**
 - Analytical Tools: Identify limitations and suggest remedies.
 - Data Collection: Identify limitations and suggest remedies.
 - Analyst/Decision Maker Interactions: Establish reasonable expectations.

STRUCTURE

DAY 1: PLENARY SESSIONS

OSD/External Perspectives

- Congress (Mr. Christopher Jehn, CBO)
- Environment (ADM Harry Train, Ret, NSSG)
- Policy (Mr. Andy Hoehn, OSD/S&TR)
- Analysis (Mr. Vince Roske, JCS/J-8)
- Analysis (Mr. Jim Johnson, OSD/PA&E)
- Panel (Dr. David Chu, RAND)

Service Perspectives

- Navy (Mr. Bruce Powers)
- Marines (LtGen John Rhodes)
- Air Force (LtGen William Begert)
- Army (MG Robert St Onge)
- Panel (Gen Larry Welch, Ret IDA)

Guest presentation: Ms. Michele Flournoy (Process and Analytic Challenges)

Special presentation: LTC Charles Bruce (Dynamic Commitment)

WORKING GROUP MEETINGS

DAY 2-3:

Integration

Respond

- Combat Operations
- Information Operations (IO)
- Asymmetric Challenges
- Readiness

Shape

- Engagement Overseas Presence
- Small Scale Contingencies (SSC) and OOTW

Prepare

- Force Modernization
- Infrastructure

FEATURE PRESENTATIONS

- JWARS (Dr. Jim Metzger)
- JDS (Ms. Elaine Simmons)
- Collaborative Analysis (Lt Col Kirk Yost)

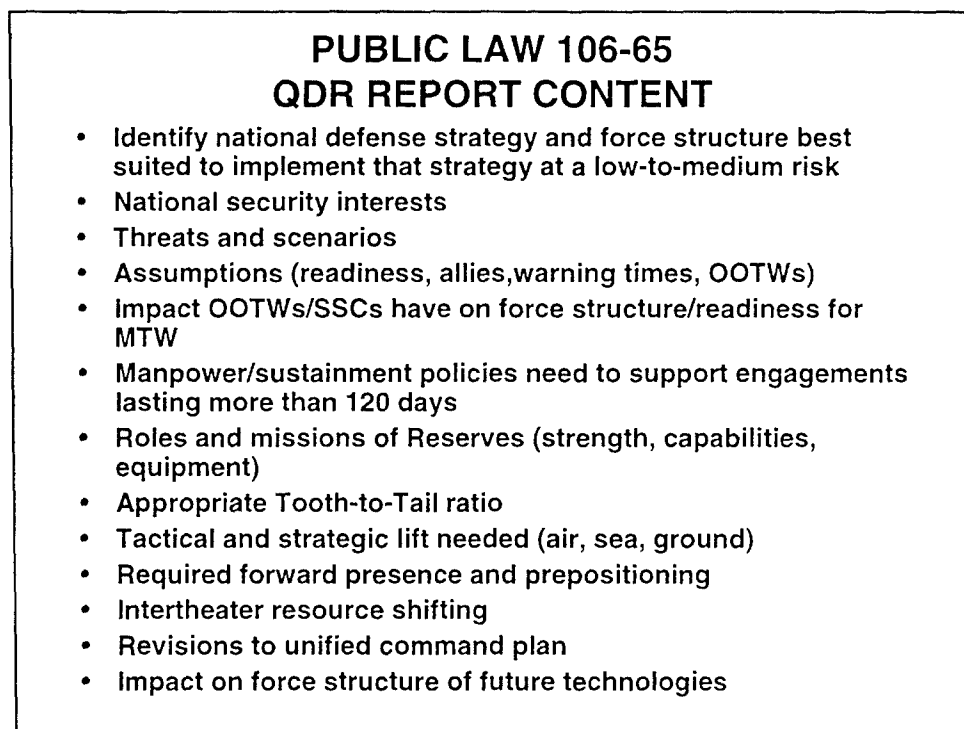
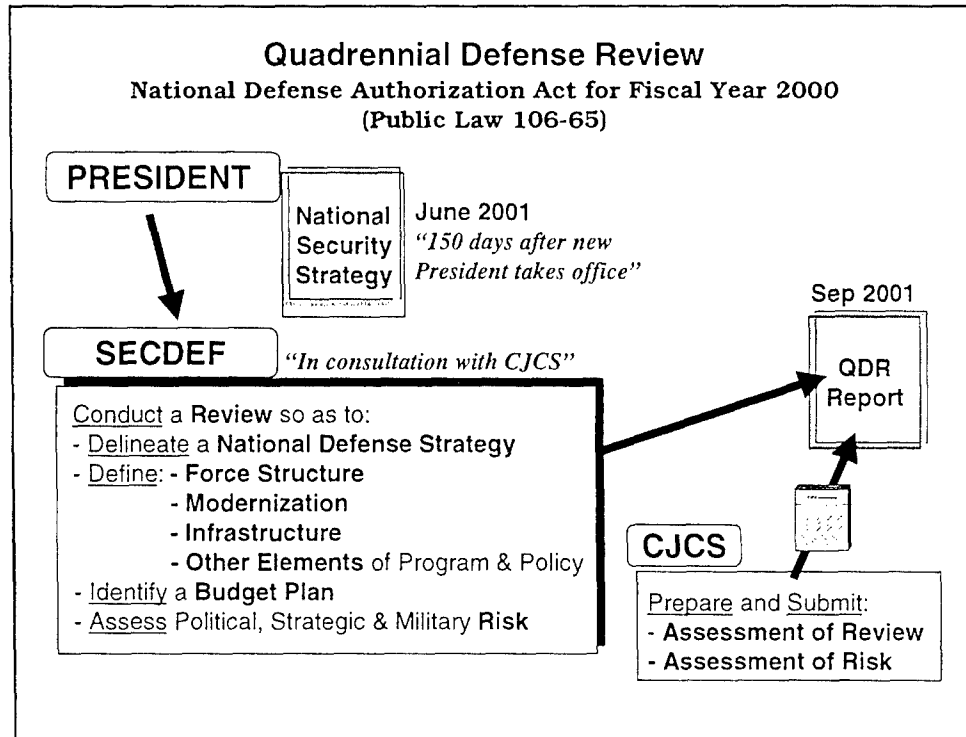
DARPA

- Tactical Technology (Dr. David Whelan)
- Special Projects (Dr. Amy Alving)

CAVEATS

- Subject is both large and complex — generating many different viewpoints and ways of expressing them
- Vetted with most key organizers but not with presenters
- More detailed summary of presentations and working group reports will be published later

PLENARY SESSION PERSPECTIVES



OBSERVATIONS FROM OSD/JCS PLENARY SESSIONS

- **Changing environment**
 - More emphasis on homeland defense
 - Increasing importance of information
 - Potential for catastrophic terrorism
 - Decreasing access to overseas bases
- **Expectations**
 - Hope to emphasize strategy, but expect QDR to be resource constrained
 - Department should be prepared to consider transformation of forces to meet new and diverse future challenges
 - Major focus will be balancing funding for personnel, tempo and modernization
- **Analysis challenges**
 - Broad-based — include more than just DoD and “traditional” missions
 - Use collaborative approach

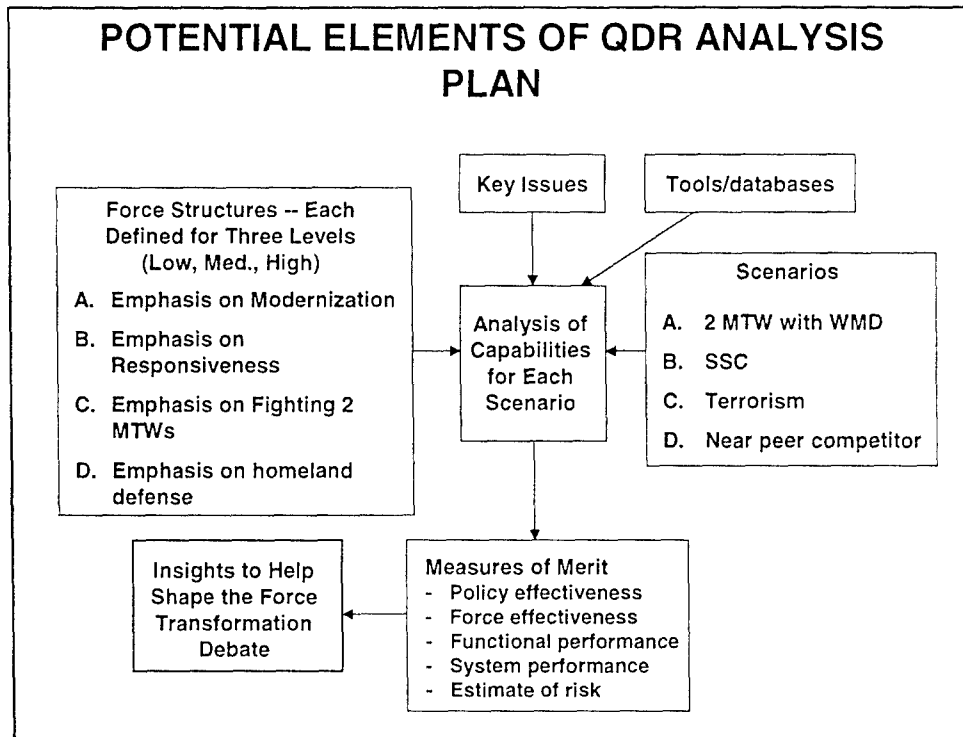
OBSERVATIONS FROM OSD/JCS PLENARY SESSIONS -- Cont'd.

- **Analysis challenges - continued**
 - Identify data and modeling needs early: now is time for “long-lead” work
 - Develop better methods for measuring risk, understanding tempo
 - Include coalition and allied contributions
 - Develop tools for “effects-based” analysis; measure value of C4ISR, strategic interdiction, etc.
 - Develop and exercise decision support tools to support integration and decision-making

Need to develop analytic game plan



POTENTIAL ELEMENTS OF QDR ANALYSIS PLAN



WORKING GROUP CHAIRS AND CO-CHAIRS

- **Integration**
 - Dr. Robin Buckelew, Center for Land Warfare (Chair)
 - Dr. Paul Davis, RAND (Co-Chair)
- **Shape**
 - Dr. Dave Perin, CNA (Chair)
 - Dr. George Akst, MCCDC (Co-Chair)
 - **Engagement/overseas Presence**
 - Mr. Dean Free, N81 (Chair)
 - LCDR John Ruck, N81 (Co-Chair)
 - **Small Scale Contingencies And OOTW**
 - COL Forrest Crain, DMSO (Chair)
 - Mr. Dean Hartley, ORNL (Co-Chair)
- **Respond**
 - COL Bob Clemence, JCS/J8 (Chair)
 - **Combat Operations**
 - COL Andy Loerch, CAA (Chair)
 - Col Rich Hanley, AFSAA (Co-Chair)

WORKING GROUP CHAIRS AND CO-CHAIRS Cont'd.

Information Operations

- Mr. Steve Myers, JHU/APL (Chair)
- Dr. Bill Kemple, NPS (Co-Chair)

– Asymmetric Challenges

- LTC Jerry Glasow, DUSA(OR) (Chair)
- LTC Bruce Bowman, J-8 (Co-Chair)

– Readiness

- Dr. Laura Junor, CNA (Chair)
- Ms. Teresa Coady, OSD/RP&A (Co-Chair)

• Prepare

- Dr. Jackie Henningsen, FS, AF/XOC (Chair)
- Mr. Vern Bettencourt, FS, HQDA, DCSOPS (Co-Chair)

– Force Modernization

- Mr. Eric Coulter, OSD/PA&E (Chair)
- Dr. George Koleszar, IDA (Co-Chair)

WORKING GROUP CHAIRS AND CO-CHAIRS Cont'd.

– Infrastructure

- Dr. Sam Kleinman, CNA (Chair)
- Dr. Frank Camm, RAND (Co-Chair)

• Synthesis

- Dr. Stu Starr, FS, MITRE (Chair)

WORKING GROUP -- GENERAL RECOMMENDATIONS

- Prepare an analytic game plan
- Establish A process to help build strong analyst-decision maker relationships
- Develop standard set of Measures Of Merit (MoM)
- Develop better methods for measuring risk
- Use an open transparent process that uses classified and unclassified web sites to share information
- Use decision support packages to
 - Provide feedback loops to help analysis influence changes
 - Share results by summarizing them on the Web page
- Encourage early OSD/JCS guidance with regard to scenarios/timeframe and issues/decision space
- Define A process to facilitate the consistency of QDR decisions with JV 2015 visions

ONGOING ACTIVITIES IN PREPARING FOR QDR- 2001 (Partial List)

- General
 - JV 2015
- Shape
 - Dynamic Commitment (DC)
 - Regional Engagement and Presence (REP) JWCA assessment
 - Navy forward presence workshops
 - Ongoing TEP CINC analysis
 - European and Asian posture reviews (OSD)
- Respond
 - Joint Strategy Review
 - WMD studies by IDA, DTRA, UK/US, AMC, DARPA
 - Information Superiority Investment Strategy (ISIS) (ASD(C3I))
 - Bosnia/Kosovo Lessons Learned
 - Readiness monitoring activities
- Prepare
 - Analysis of Alternatives (AoA) for several programs (JSF, AEA ...)
 - Base closure, competition and outsourcing, and inventory management studies

ANALYTICAL CHALLENGES

- **Integration**
 - More use of risk/uncertainty assessing methods (e.g., exploratory analysis, portfolio methods)
 - Develop single mission “models” for special situations
- **Shape**
 - Develop better methods to measure the effectiveness of deterrence/engagement, and SSC/OOTW missions
 - Assess the force structure needed to support presence/engagement/SSC/OOTW missions
 - Perform cost benefit analyses of shaping activities
 - Balance low-risk but high-frequency operations with high-risk low-frequency operations
 - Increase the robustness of the scenario set explored by Dynamic Commitment (DC)

ANALYTICAL CHALLENGES — Cont'd.

- **Respond**
 - Theater level:
 - Develop better representations of maritime operations
 - Create COSAGE ground combat inputs for newer scenarios
 - Improve chemical/biological representation
 - Develop methods to degrade performance due to readiness shortfalls
 - Information Operations:
 - Represent the interaction between IW/IO and conventional forces
 - Model the network centric and effects-based operations
 - Include non-DoD agencies in analysis
 - Asymmetric threats
 - Improve modeling of non-WMD threats (terrorism, mines, political manipulation)
 - Include in wider range of scenarios (e.g., WMD in SSCs)

ANALYTICAL CHALLENGES — Cont'd.

- Readiness
 - Develop methods to allocate resources so as to maximize readiness
 - Articulate degree of readiness needed to perform full spectrum response under various initial conditions (MTW, SSC, homeland defense, etc.)
- Prepare
 - Modernization
 - Improve methods to demonstrate the military worth of modernization initiatives
 - Adapt analysis tools/data to reflect new technologies, system capabilities, tactics, ...
 - Identify and perform trades among functional areas (e.g., platforms vs munitions, sensors vs shooters)
 - Infrastructure:
 - Develop methods to link infrastructure to mission effectiveness
 - Develop methods to measure the impact of infrastructure changes on organizational behavior

STATUS OF CAMPAIGN MODELING IN QDR 2001

- Joint Warfare System (JWARS)
 - Largest constructive model development ever undertaken by Department
 - May not be sufficiently developed to replace Legacy models by start of QDR 2001 (training, data, analyst familiarity)
 - Will provide help in several areas
 - Integration of logistics and the warfighter
 - Value of C4ISR systems
- Legacy Campaign Models (TACWAR, Thunder, JICM) have continued to improve
 - Logistics
 - ISR
 - Ground combat
 - WMD

BETTER, MORE ACCESSIBLE DATA

- Develop template for databases (JDS Good First Step)
- Identify assumptions behind data
- Continue PERSTEMPO database development
- Develop data for scalar multipliers that reflect readiness levels in theater level models
- Use MRS-05 as starting point for QDR
- Develop standards and collection plans for IO/IW, readiness and infrastructure data
- Improve quality of chemical weapon effectiveness data
- Build database for C4ISR constructs that use perception-based decision making

LONG-TERM RECOMMENDATIONS

- Include Joint And Service experimentation insights in analysis
 - I/O
 - WMD
- Establish a recurring joint analysis program, with a two-year frequency, to perform a budget year and end-of-POM assessment of warfighting risk
- Use quantitative methods to inform the IPS writing process

HOW MORS CAN HELP

- **Sponsor Workshop on defining and measuring risk in the fall Of 2000**
- **Create a web-based library with appropriate links to organizations and documents**
 - Tools/models
 - Publications
- **Add asymmetric threat working group to MORS Symposium and hold an asymmetric mini-symposium**

SUMMARY OF KEY RECOMMENDATIONS

- **Establish an open, collaborative analysis environment**
- **Develop an analytic game plan**
- **Develop better ways for measuring risk**
 - MORS workshop in fall?
- **Use decision support tools to help manage QDR**
- **INCLUDE Non-DoD AGENCIES IN QDR**
- **Improve quality of data (readiness, infrastructure, IO/IW, WMD)**

Mini-Symposium & Workshop on Joint Analysis: QDR 2001 and Beyond

Synthesis Group

3 February 2000



This presentation provides the highlights from the deliberations of the Synthesis Working Group. The Synthesis Group was comprised of four members:

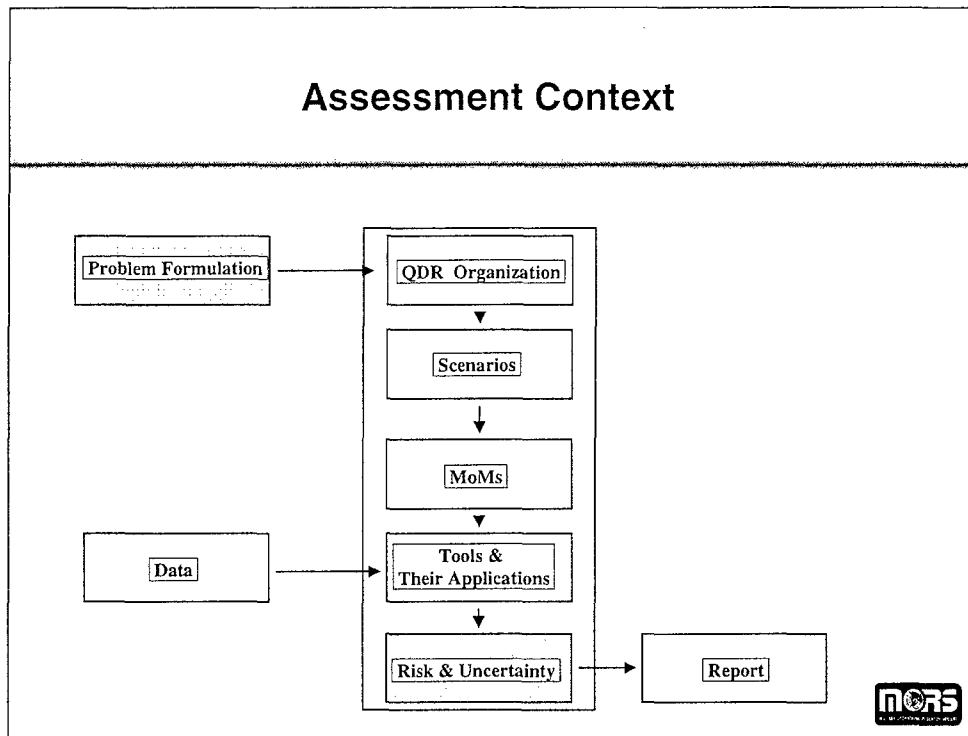
- Dr. Stuart Starr, FS, MITRE, Chair
- Dr. Jerry Kotchka, Lockheed Martin
- Bob Orlov, J8, Joint Staff
- Bill Kemple, Naval Postgraduate School

Agenda

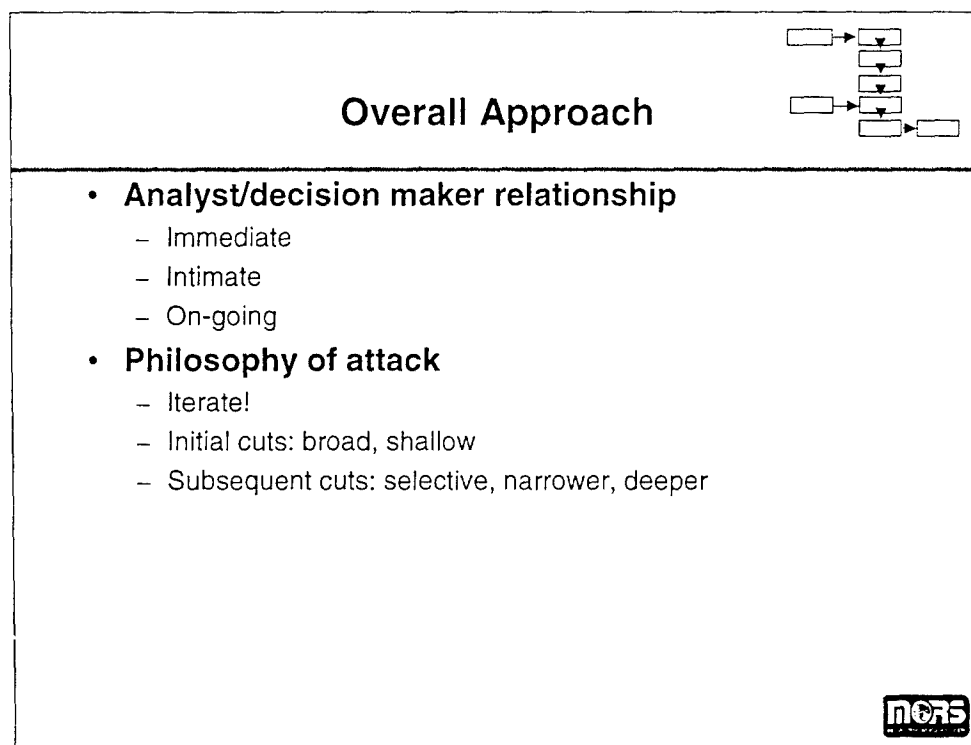
- **Assessment context**
- **Key observations, recommendations**
- **Conclusions**
 - Prior MORS QDR Workshops
 - Selected bottom lines



As a framework for its deliberations, the Synthesis Group developed an assessment context that is based on the principles of sound operational analysis. Using that framework, this Summary focuses on eight key areas: (1) problem formulation, (2) QDR organization, (3) scenarios, (4) Measures of Merit (MoMs), (5) data, (6) tools (and their use), (7) risk and uncertainty analyses, and (8) the report. For each area, key observations and recommendations are provided. The report concludes with some overall observations on prior MORS workshops, a “scorecard” on the workshop, and steps that MORS should take to follow up on this workshop.



The Synthesis Group employed the above framework as a context for its assessment. The framework is predicated on the basic principles of operational analysis. As a cornerstone of the framework, a sound formulation of the problem is essential. This entails an articulation of the real issues of interest and the development of a conceptual framework within which to analyze them. Second, is an organization for the QDR that is consistent with that conceptual framework. Third, the assessments for the QDR need to be performed in the context of a family of community-wide scenarios. Fourth, commonly adopted sets of Measures of Merit (MoMs) are defined which provide insights into the issues of interest. In order to evaluate these MoMs (and to characterize the linkages among these MoMs) appropriate data and tools are required. Subsequently, it is important to perform risk and uncertainty analyses to illuminate this dimension of the issues of interest to the decision maker. Finally, the results of the assessments are documented to facilitate peer review and to provide a foundation for future analyses to build upon.

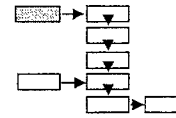


There are two key dimensions of this overall approach that warrant emphasis. First, there is the issue of the analyst/decision maker relationship. It is critical that this relationship be initiated immediately, be intimate, and remain on-going throughout the period of assessment. One approach to initiating and sustaining this relationship is articulated in the Synthesis Group report in the Proceedings of the MORS Workshop on Quick Reaction Analysis and Methodology (GRAM) (Reference 1).

Second, there is the philosophy of attack. It is recommended that an *iterative* approach be employed to deal with the “curse of complexity.” Initially, “cuts” at the assessment should be broad and shallow. This provides a preliminary, holistic view of the problem and serves to identify key issues that warrant deeper analyses. This approach provides a sound basis for managing the allocation of scarce assessment resources to the most critical issues.

Note that both of these recommendations were proposed during GRAM (Reference 1), although they were never completely implemented in QDR 1997.

Problem Formulation: Issue Area Identification — Observations



• Observations

- Clearly, highest priority must be placed on addressing Congress' 13 questions (e.g., determine the appropriate 'tooth-to-tail' ratio).
- Several other issue areas warrant attention; e.g.:
 - Bill Perry - Ash Carter problem sets (i.e., A -- catastrophic terrorism; B -- MTWs; C -- OOTW).
 - Areas highlighted by plenary speakers; e.g.:
 - Homeland defense (NSSG).
 - Allied/coalition contributions (OSD(Policy)).



At the heart of the formulation of the problem is the identification of the key issue areas. Clearly, the highest priority must be placed on addressing the thirteen questions called out in the legislation that established QDR 2001 (Reference 2). Unfortunately, many of those questions are poorly framed from the perspective of the analyst. For example, one of the questions calls for the determination of the "appropriate 'tooth-to-tail' ratio." As observed by MG Mark Hamilton at an earlier MORS QDR Workshop (Reference 1), the metaphor of 'tooth-to-tail' is better suited to the Cold War than the New World Disorder [Note: MG Hamilton called for a more complex metaphor, to include additional "body parts" (e.g., "lips", to represent the role of such critical assets as C-17 transport aircraft) to reflect the nature of complex contingency operations].

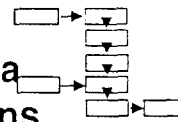
In addition, as identified during this mini-symposium and workshop, there are many new issues that must be addressed. One key source of issues has recently been articulated by Bill Perry and Ash Carter (Reference 3). They articulated three classes of national security issues:

- (1) The "A list" of threats on the scale that the Soviet Union presented to Western survival (e.g., catastrophic terrorism);
- (2) The "B list" of imminent threats to Western interests (but not survival) (e.g., analogues to the Gulf War);
- (3) The "C list" of important contingencies that indirectly affect Western security, but do not directly threaten Western interests (e.g., Kosovo, Bosnia, Somalia).

It is notable that the 1997 QDR focused almost exclusively on "B list" issues.

In addition, a number of the plenary speakers during the Mini-Symposium identified key issues that warrant intensive analysis. For example, Admiral Harry Train (USN, ret), in summarizing the initial findings of the Hart-Rudman Commission, emphasized the challenges associated with Homeland Defense. Andy Hoehn, DASD(Policy), raised the question of how QDR 2001 would address the question of allied/coalition contributions to overall national security.

Problem Formulation: Issue Area Identification — Recommendations



- **Recommendations**

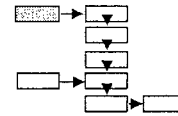
- Initiate dialogue with decision makers to ensure that focus areas are transformed into well-articulated problems that are amenable to analysis.
- Be prepared to respond to guidance from the new Administration.



In light of these observations, it is recommended that dialogue be initiated with decision makers to ensure that focus areas are transformed into well-articulated problems that are amenable to analysis. As an initial step, consideration should be given to undertaking a dialogue with the Congressional principals and their staffs to illuminate and refine the thirteen questions at the heart of the QDR.

In addition, in order to respond to potential guidance from the new Administration, it is suggested that analysts go beyond the “B list” emphasis of the prior QDR by making preparations to address the issues associated with the A and C lists.

Problem Formulation: QDR Conceptual Framework



- **Observations**

- Due to the complexity of the undertaking, a conceptual framework is needed to facilitate:
 - Decomposition of the problem into feasible subsets.
 - Synthesis of the results into a coherent, credible story.
- The conceptual framework employed in QDR 1997 proved to be unwieldy and inflexible.

- **Recommendation**

- Adopt simple, complementary conceptual frameworks; e.g.:
 - Shape, Respond, Prepare (noting the internal overlaps).
 - Matrices of Level of Conflict vs Mission Challenges (e.g., Territorial Defense, Peace Operations), over time.

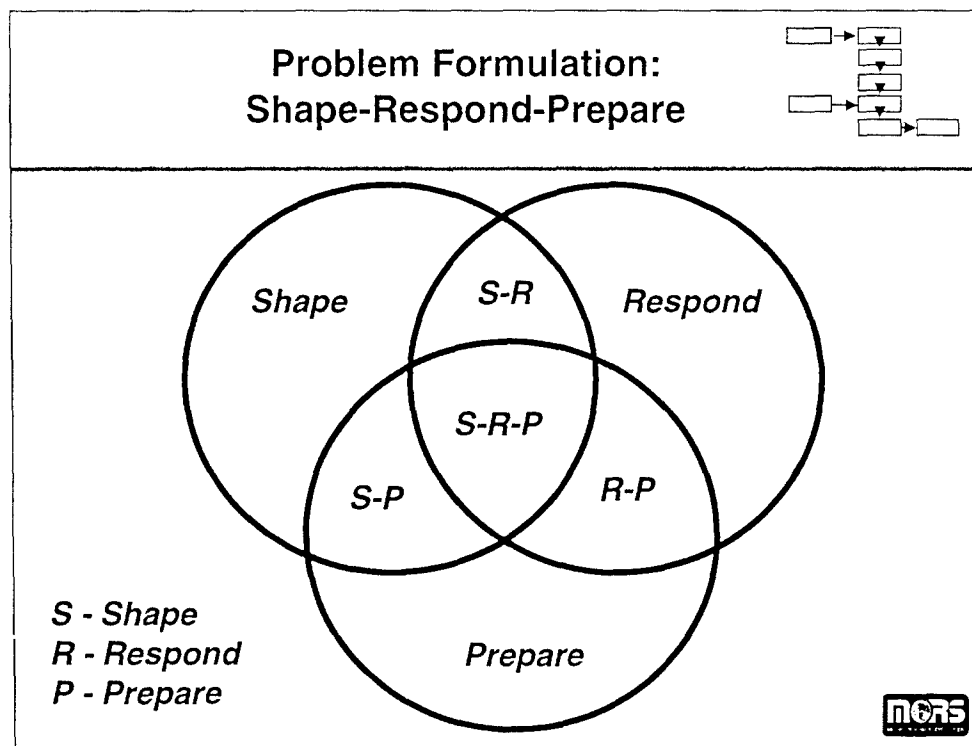


Observations

Given the number and complexity of the issues of interest, a conceptual framework is needed to facilitate two actions: *decomposition* of the problem into coherent, feasible subsets which are amenable to analysis, and *synthesis* of the results of those analyses into a coherent, credible story. If this conceptual framework is to be effective, the decomposition should result in (quasi-) orthogonal subsets which would facilitate the synthesis process. Note that QDR 1997 failed to formulate and implement such a conceptual framework, greatly complicating the synthesis of the myriad analyses into a coherent story (Reference 4).

Recommendations

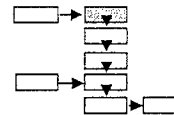
It is recommended that a simple, complementary framework be adopted. One possibility is evolving the conceptual framework that was employed in QDR 1997. This variant is described on the next page.



In QDR 1997, the basic conceptual framework revolved around the concepts of Shape, Respond and Prepare Now. Although this conceptual framework helps to frame the problem, it suffers from the fact that the three categories have considerable areas of mutual overlap. That fact is dramatized by the difficulty that the organizers of this workshop had in parsing the working groups (e.g., it placed SSC and OOTW in the Shape category, even though they clearly are an element of Respond, as well). To deal with this issue, it is recommended that a modified conceptual framework be considered that consists of the seven orthogonal components identified in the above Venn diagram. Using this approach, SSC and OOTW would be elements of Shape-Respond.

In addition, Andy Hoehn presented a complementary conceptual framework that revolved around the dimensions of the conflict spectrum (e.g., Major Wars, SSCs) and selected mission areas (e.g., Territorial Defense, Power Projection, Peace Operations, Strategic Defense, Humanitarian Assistance/Disaster Relief). A composite, three dimensional conceptual framework that encompassed these three factors might facilitate the decomposition and synthesis of future analytical work for QDR 2001.

QDR Organization



- **Observation**

- The JS-proposed QDR organization may have difficulty dealing with synthesis issues.
- Many of the potential issue areas involve participants outside of DoD; e.g.:
 - Other Executive organizations (e.g., State, Treasury, Transportation, Justice, FEMA).
 - State and Local organizations (e.g., emergency responders).
 - Non-Governmental Organizations.

- **Recommendation**

- Explore alternatives to the JS-proposed QDR organization that ameliorate synthesis problems [N.B.: Consider an IPT approach].
- Ensure appropriate participation from non-DoD organizations.



Observations

During the plenary session, a proposed QDR organization was described for the Joint Staff (JS). It included groups that would address questions such as Strategy and Risk Assessment; Force Generation, Capability and Structure; Modernization; Readiness; Sustainment, Mobility, Infrastructure; Transformation, Innovation, Joint Experimentation; Information Superiority; Human Resources; and Integration. This organizational framework, while matching the responsibilities of the JS organizations, may pose some analytical difficulties. For example, the subject of information superiority pervades many of the other categories. Thus, it would be left to the Integration Group to deal with those overlapping factors in its synthesis process. This may prove to be an exceptionally challenging task.

In addition, many of the issues associated with A and C list issues (e.g., catastrophic terrorism; OOTW) inherently involve participants outside of DoD. In the case of catastrophic terrorism, this would include other Executive organizations (e.g., Justice, FEMA, Transportation, Treasury, State) and various State and Local organizations (e.g., emergency responders associated with public health, emergency medicine, police, fire).

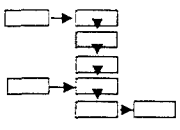
Recommendations


It is recommended that alternative organizations be explored that ameliorate the potential synthesis problems that may exist in the JS-proposed QDR organization. Consideration should be given to the formation of Integrated Process and Product Teams that contain the appropriate mix of knowledge and experience to address key cross cutting issues.

In order to be prepared to address A and C list issues, a mechanism is needed to elicit the appropriate support of relevant non-DoD organizations in QDR deliberations.

Scenarios

- **Observations**
 - Most presenters identified basic issues in QDR scenarios; e.g.:
 - Is there a baseline scenario(s)?
 - How can we keep scenarios as simple as necessary (...but no simpler!)?
 - What and how many excursions should be undertaken?
- **Recommendations**
 - Employ an analytical approach that entails identifying and exploring “interesting” parts of the scenario space [N.B.: this will be a function of the issue area].





Observations

During the course of the plenary briefings, most presenters noted that a scenario-based approach to analysis was vital, but difficult to implement. Those speakers identified several basic issues in the area of potential QDR scenarios [See the above vugraph for a representative set of those issues]. In particular, the presentations on Dynamic Commitment, a key potential tool for the QDR, stressed that resource constraints would limit them to the use of a single scenario (albeit a complex one, created by drawing from a set of 63 potential vignettes).

Recommendations

The challenge is to identify and explore those segments of scenario space that are “interesting” from the perspective of the issues of interest. Several activities (e.g., recent RAND studies (Reference 5); NATO Code of Best Practice on the Assessment of C2 (Reference 6)) have proposed techniques for constructing and assessing scenarios to identify those regions where key Measures of Merit (MoM) exhibit “interesting” performance (e.g., key transition regions). Those approaches may be relevant to the QDR.

Measures of Merit

- **Observations**
 - Most presenters identified the need to develop and employ new, appropriate “Measures of Effectiveness.”
- **Recommendation**
 - Build on prior MORS work to formulate linked, hierarchies of Measures of Merit (MoMs); e.g.:
 - Measures of Policy Effectiveness.
 - Measures of Force Effectiveness.
 - Measures of Functional Performance.
 - Measures of System Performance.
 - Standardize MoMs, to the degree feasible, to facilitate synthesis of individual assessments.

Observations

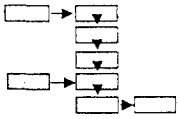
Nearly all of the Working Groups concluded that they lacked appropriate Measures of Effectiveness to guide analytic activities in the forthcoming QDR. This need was particularly pronounced for areas such as Overseas Presence, OOTW, and Information Operations (IO).

Recommendations


In the mid-1980s, MORS conducted a series of workshops to develop Measures of Merit (MoM) for C3I analyses. It was concluded that a set of linked, hierarchies of measures were needed to support analytical needs. Building on that foundation, it is recommended that the community extend that hierarchy in two dimensions. First, the concept should be applied to issues that transcend C3I analyses (e.g., OOTW, IO). Second, to reflect the nature of New World Disorder missions, it is recommended that the hierarchy be extended to reflect Measures of Policy Effectiveness (MoPE). As an illustration, consider the operation in Mogadishu, Somalia, where the US suffered the loss of 18 servicemen while 500 to 1000 Somali's were killed. Traditional Measures of Force Effectiveness (MoFE) (e.g., Loss Exchange Ratio) would label the operation to be a success, while it was, in fact, one of the greatest policy defeats in American history, resulting in an immediate withdrawal from the theater.

Several analysts observed that if standardized MoMs could be formulated for key mission areas, it would facilitate the synthesis of individual assessments. (This recommendation was also made in Reference 4.)

Data



- **Observations**
 - The JDS is a major step forward, however...
 - We are deficient in data that are:
 - Consistent.
 - Complete.
 - Verified, Validated and Certified (VV&C'ed).
 - The need is greatest in the C4ISR domain.
- **Recommendations**
 - The Community must take immediate steps to fill critical holes.
 - In the longer term, link the JDS and the Modeling and Simulation Information Analysis Center (MSIAC) to promote data reuse.



Observations

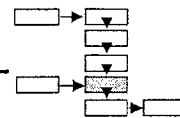
During the Plenary Session, Ms Elaine Simmons provided a briefing on the Joint Data Support (JDS). Although JDS is limited to providing the data needed for a limited set of tools (e.g., JWARS), the program is perceived as a major step forward in treating the data problem. However, Ms Simmons observed that even in JDS, we are deficient in data that are consistent, complete, Verified, Validated and Certified (VV&C'ed). In addition, she stated that the need is greatest in the C4ISR domain.

Recommendations

In view of the criticality of the data problem for the QDR, it is recommended that the Community identify those areas where the data voids are most critical (given the key issues of interest) and take immediate steps to fill those holes.

In the longer term, it is recommended that steps be taken to link the JDS and the Modeling and Simulation Information Analysis Center (MSIAC) to promote the reuse of data in the Community.

Tools (and Their Application) — Observations



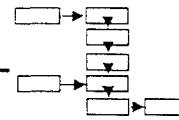
- **Observations**

- The bulk of the conventional warfare tools that we have:
 - Are attrition-based.
 - Fail to include critical first-order factors (e.g., decision making; IO).
- Key voids exist in our tools and knowledge associated with New World Disorder (and "Old World") issues (e.g., coerce an adversary).
- Dynamic Commitment will be a lynch pin for the QDR — but concerns persist about its use and validity.



During the course of the Mini-Symposium and Workshop, many presenters identified and described the tools that are emerging to support the QDR. Based on those presentations several important observations emerged. First, the bulk of the conventional warfare tools that we have are attrition-based and fail to included critical factors that are needed for credible analysis (e.g., few tools effectively represent dimensions such as decision making or Information Operations (IO)). Second, key voids exist in our knowledge and tools associated with New World Disorder issues (and, in selected cases, with "Old World" issues!). For example, US national interests have increased the importance of being able to conduct an effective coercive operation against an adversary (e.g., coerce a Saddam Hussein by conducting embargo operations; influence a Slobodan Milosevic by undertaking an air campaign). Currently, we lack the knowledge and tools needed to assess the likely effectiveness of such operations. Finally, it was observed by several speakers that Dynamic Commitment (DC), with its ability to support the assessment of the Services' ability to support a broad range of conflicts, is likely to be a lynch pin for the QDR. However, there are concerns about its use and validity because current resource constraints suggest that only a single, complex scenario will be employed in each major application of DC.

Tools (and Their Application) — Conclusions



- **Recommendations**

- Develop and implement Analysis Roadmaps, featuring an orchestrated spectrum of tools; e.g.:
 - Structured expert elicitation.
 - Simple models (e.g., spreadsheets; systems dynamics; Petri Nets).
 - Selected complex M&S (e.g., constructive federates; virtual M&S).
 - Lessons recorded from operations.
- Build on promising community initiatives (e.g., GMU's effects-based analysis).
- Plan to use more than a single scenario in Dynamic Commitment.

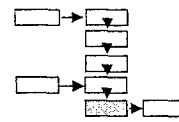


During the mini-symposium, Ms Michele Flournoy, INSS, NDU, recommended that Analysis Roadmaps be developed and implemented to address key QDR issues. That recommendation was also made during the prior MORS Workshop on QDR Lessons Learned (Reference 4) and it is strongly endorsed. In that concept an orchestrated spectrum of tools (and MoMs) would be employed to address key QDR issues. That spectrum would subsume appropriate linked examples of structured expert elicitation, simple models (e.g., spreadsheets, systems dynamics, Petri Nets), selected complex M&S (e.g., constructive federates, virtual M&S, live M&S), and lessons recorded from actual operations. It would call for the iterative application of these tools ranging from broad, shallow analyses of issues to clarify the nature of the problem (typically using expert elicitation and simple models), to narrower, deeper analyses (typically using more complex M&S).

In addition, there were several presentations during the workshop that served to identify promising new tools. For example, Professor Alex Levis, GMU, discussed an evolving effects-based tool to address courses of action that subsumed the time-phased application of both lethal attacks and IO. Those techniques should be expanded and built upon.

Finally, as noted above, Dynamic Commitment constitutes a unique tool that has the potential to give insight into the challenging problems of OPSTEMPO and PERSTEMPO. However, a great deal of its utility as an analytical tool will be lost if it is not exercised employing *several* scenarios, (i.e., replications of the game).

Risk and Uncertainty



- **Observations**

- It was broadly recognized that we lack a common understanding of how to define and quantify risk.

- **Recommendation**

- Draw upon the risk assessment literature (e.g., environmental remediation; assessment of hazardous activities) to adapt an appropriate:
 - Definition.
 - Methodology(s).
- Consider the adoption of the “flexibility” concept presented in the Collaborative Analysis Case Study.



Observations


In the law directing DoD to conduct QDR 2001 (Reference 2), it was stated that “The report shall include the following: (1) The results of the review, including a comprehensive discussion of the national defense strategy of the United States and the force structure best suited to implement that strategy at a *low-to-moderate level of risk*.” This mandates that the analysts supporting the QDR deal explicitly with the concept of risk. However, it was broadly recognized at both the mini-symposium and the workshop that we lack a common understanding of how to define and quantify risk. (This observation was also made in Reference 1.)

Recommendations

There is a broad body of literature that deals with risk assessment in many domains (e.g., environmental remediation; assessment of hazardous activities; investments in portfolios of equities and bonds). That literature should be reviewed to derive a meaningful definition of risk within the context of national security and to identify appropriate methodologies for risk assessment. As a preliminary point of departure, the use of “flexibility” as a surrogate for risk employed in the Collaborative Analysis Case Study (briefed during the mini-symposium) should be re-examined.

Report

- **Observations**
 - QDR 1997 could have done better in:
 - Articulating a high level, understandable story that was credible to Congress.
 - Documenting, archiving assessments performed .
- **Recommendation**
 - Answer Congress' questions simply, clearly, and eloquently.
 - Implement an archiving process to "provide shoulders of giants" that QDR 2005 can stand upon:
 - Assign responsibility.
 - Hold them responsible.



Observations

Several speakers observed that the QDR 1997 Report and documentation were deficient in several ways. First, the Report did not clearly articulate a high level, understandable story that was credible to Congress. For example, it stated that information superiority was the cornerstone of DoD's strategy. However, it then proceeded to reduce funding for JSTARS, one of the systems that was central to that concept. Second, although an enormous amount of analysis was performed to support the review, relatively little effort was made to document and archive the assessments that were performed. Thus, there is a limited audit trail that analysts can employ as they prepare to perform the analyses for QDR 2001.

Recommendations

The basic objective of the QDR 2001 Report should be to answer Congress' questions simply, clearly and eloquently. It should also be remembered that the public, at large, is an essential part of the audience for the report. Thus, consideration should be given to creating the analogue of "Napoleon's Corporal" to read early drafts of the document to ensure that it is truly comprehensible and compelling. In addition, it is vital that the analyses that are conducted to support the Review are properly documented and archived to serve as the foundation for future QDRs. Since it is unlikely that this will occur without overt action, an organization should be assigned responsibility for archiving these products and be held responsible for doing so.

Conclusions: Prior MORS Workshops

- **Observations**

- At prior MORS Workshops (e.g., QRAM, QDR Lessons Learned), many of the above recommendations were made -- and generally not implemented effectively!
- Clearly, they were “lessons recorded” vice “lessons learned”!

- **Recommendation**

- Be more aggressive in briefing the findings of this workshop:
 - Ask Sponsors if they can be briefed more widely in DoD.
 - Consider presenting the briefing to the next Administration's Transition Team.
- Get the Workshop results disseminated as soon as possible!



Observations

Over the past four years, MORS has sponsored two workshops devoted to the QDR process (References 1, 4). At those Workshops, many of the recommendations cited above had been proposed. Unfortunately, those recommendations were rarely implemented effectively — if at all. One might conclude that they stand as “lessons recorded” vice “lessons learned.”

Recommendations

In light of this historical experience, it is recommended that the Workshop Chairs be more aggressive in briefing the results of the Workshop. As a minimum, it would be desirable to ask the Sponsors if they will allow the results to be presented more widely in DoD. In addition, consideration should be given to presenting the briefing to the next Administration's Transition Team.

In view of the short time period that is available for QDR planning, every effort should be made to disseminate its findings as soon as possible. This would include rapid creation and dissemination of the workshop proceedings.

Conclusions: Some Bottom Lines

- **Let us make sure that we avoid the classical error of preparing for the last QDR, vice the next QDR**
- **Two views were voiced about the nature of the next QDR**
 - Optimistic View:
 - "The QDR will be strategy driven, not resources driven."
 - "Analyses will be collaborative, cooperative, collegial."
 - Cynical View:
 - "It's the resources, stupid!"
 - "It's every man (Service) for himself!"
 - Questions:
 - What incentives can be offered to encourage the former behavior?
 - How can we constructively manage the latter behavior?



During the course of the mini-symposium and workshop, several major points were made that warrant emphasis. Eric Coulter, Chair of the Force Modernization Subgroup, exhorted his group to avoid the classical error of preparing for the last QDR vice the next QDR. As one dimension of that advice, analysts must be prepared to analyze list A and C issues effectively, and not merely the list B issues that were the focus of the last QDR.

In addition, several individuals at the Mini-Symposium articulated two diametrically opposing views of the QDR process. The more optimistic Service representatives stated that QDR 2001 will differ from its predecessor in two ways: the QDR will be strategy driven, not resources driven, and analyses will be collaborative, cooperative and collegial. Conversely, several more pessimistic individuals suggested that the following cynical philosophies were more likely to prevail: "It's the resources, stupid!" and "It's every man (Service) for himself!"

These opposing viewpoints raise two critical questions. First, what incentives can be offered to encourage the former behavior? Second, how can we constructively manager the latter behavior? It is vital that individuals with a leadership role in QDR 2001 take these questions seriously and take steps to implement the conclusions.

Mini-Symposium, Workshop Scorecard

- **Facilitating the exchange of ideas, approaches — A**
- **Generating energy, enthusiasm for**
 - The forthcoming QDR — B+
 - Beyond — A
- **Enhancing the quality of QDR 2001 — TBD**



As a Synthesis Group, it is appropriate to provide a “scorecard” for the mini-symposium and workshop.

We felt very strongly that the activity deserved a solid “A” in the the area of facilitating the exchange of ideas and approaches. In general, the formal presentations were excellent and they stimulated extensive, thoughtful interaction from the participants.

The situation was slightly more complicated for the category of generating energy and enthusiasm. Although most of the participants were clearly motivated by the impending QDR and the challenges that they posed to the analysis community, several of the veterans of QDR 1997 expressed a sense of “déjà vu.” In view of the contentiousness of several key analyses in 1997, they expressed concern that the cynical perspective (“It’s the resources, stupid!” and “It’s every Service for itself!”) might eventually prevail. This poses a significant challenge to the leadership of the QDR to constructively manage such behavior. Looking beyond the QDR, there was extremely high energy and enthusiasm to tackle the problems implicit in the A and C lists.

Ultimately, the basic measure of the success of the mini-symposium and workshop rests on its contribution to enhancing the quality of QDR 2001. Clearly, that assessment remains “to be determined.”

What Can MORS Do Next? (1 of 2)

- **Brief results of Workshop widely**
- **Take on selected initiatives cited at forthcoming MORS Workshops (i.e., “Evolving the Practice of Military Ops Analysis in DoD”; “C4ISR Analysis”)**
 - Help develop needed:
 - Robust, Community-wide scenarios.
 - Measures of Merit.
 - Hierarchy of tools.
 - Assist in the definition and quantification of risk.
 - Help collect “Lessons Recorded” and transform them into “Lessons Learned”.
 - Help educate the community on challenges, best practices in QDR support.



The Synthesis Group concluded its deliberations by identifying several actions that MORS might do next. As stated above, the most important thing that the Society can do in the short run is to circulate widely and rapidly the findings and recommendations of the mini-symposium and workshop.

Second, MORS is planning to conduct two Workshops over the next nine months: “Evolving the Practice of Military Operations Analysis in DoD” (March 2000) and “C4ISR Analysis” (Fall 2000). Those forums provide an excellent context for addressing many of the recommendations cited in this report. They include:

- Helping to develop needed robust, Community-wide scenarios, MoMs, and hierarchies of tools to address key QDR issues.
- Assisting in the definition and quantification of risk in the context of national security.
- Helping to collect “lessons recorded” from a variety of sources (e.g., operations in Kosovo; experiments conducted by JFCOM and the Services) and transform them into “lessons learned”.
- Helping to educate the community on challenges and best practices in performing analyses to support QDR deliberations.

What Can MORS Do Next? (2 of 2)

- **Continue to collaborate with the QDR Community**
 - Convene a follow-on workshop in November-December 2001 to elicit lessons learned.
 - In 2004, hold a Workshop to prepare for QDR 2005.



In the longer term, the community should recognize that the QDR has been institutionalized by recent Congressional action. Consequently, it would be prudent to convene a follow-on workshop in the November-December 2001 timeframe to elicit lessons learned from this next iteration of the QDR process. Subsequently, four years hence, MORS should conduct a mini-symposium and workshop to prepare for QDR 2005. If the community implements many of the recommendations described above (e.g., systematically document and archive the analyses performed in support of QDR 2001), it will have “shoulders of giants” to stand upon to enhance the quality of future analyses.

References

1. Proceedings of Quick Response Analysis Requirements and Methodologies (GRAM) Mini-Symposium, MORS, Alexandria VA, 13 December 1996.
2. Public Law 106-65 -- October 5, 1999.
3. Ashton B. Carter and William J. Perry, "Preventive Defense: A New Security Strategy for America," Washington, DC, The Brookings Institution Press, 1999.
4. QDR Analysis: Lessons Learned and Future Directions Mini-Symposium, MORS, JHUAPL, Baltimore, MD, 7 - 9 April 1998.
5. Richard J. Hillestad & Paul K. Davis, "Resource Allocation for the New Defense Strategy -- The DynaRank Decision-Support System", RAND NDRI, Santa Monica, CA, 1998.
6. Code of Best Practice (COBP) on the Assessment of C2, NATO RTO Technical Report 9, RTO-TR-9, AC/323(SAS)TP/4, March 1999.



**PLENARY SPEAKERS
OSD/EXTERNAL**

- **Congressional Perspective** (Summary)
 - Mr. Chris Jehn, Assistant Director for National Security, US Congressional Budget Office
- **The Environment** (Summary)
 - ADM Harry Train, Ret., Commissioner, US Commission on National Security, NSSG
- **Policy Perspective**
 - Mr. Andy Hoehn, Deputy Assistant Secretary of Defense for Strategy, OSD/S&TR
- **Analysis/Joint Staff Perspective**
 - Mr. Vince Roske, Deputy Director (Wargaming, Simulation and Analysis), JCS/J-8
- **Analysis/OSD Perspective**
 - Mr. Jim Johnson, Deputy Director, Theater Assessments and Planning, OSD/PA&E

**PLENARY SPEAKERS
SERVICE PERSPECTIVES**

- **Army**
 - MG Robert St. Onge, Director, Strategy, Plans and Policy, HQ Department of the Army
- **Navy**
 - Mr. Bruce Powers, Office Chief of Naval Operations, N81
- **Air Force**
 - LtGen William J. Begert, Assistant Vice Chief of Staff, HQ USAF
- **Marines**
 - LtGen John Rhodes, CG, Marine Corps Combat Development Command

CONGRESSIONAL PERSPECTIVE
Mr. Christopher Jehn (Congressional Budget Office)

SUMMARY*

- Congress does not have a single perspective -- they have 535 perspectives.
- So to infer the Congressional perspective, look at the law.
- Congress wants a new QDR (and may provide further direction this year).
- Compare QDR legislation for 1997 and that for 2000/2001.
- Virtually the same requirements in 2001 as in 1997, except:
 - No National Defense Panel in 2001 (may still change).
 - Finish in September 2001 vice May 1997.
 - Specify “national security interests” in 2001.
 - Provide force structure analysis for “low to moderate level of risk.”

* Prepared by Mini-Symposium Program Committee

CONGRESSIONAL PERSPECTIVE
Mr. Christopher Jehn (Congressional Budget Office)

SUMMARY (Cont'd.)

- This probably means the following:
 - QDR should be source of fresh ideas.
 - Results should clearly state:
 - US security interests.
 - Assumptions behind the analysis.
 - Risks to the strategy and forces described.
- If you prepare to do all that, you will serve new political leadership well next year.

THE ENVIRONMENT
Admiral Harry Train (Ret)
The US Commission on National Security/21st Century
SUMMARY*

- **Most comprehensive Government-sponsored review of US national strategy in more than 50 years.**
- **Three phases**
 - I: **Future security environment (available)**
 - II: **Formulating a new national security framework (April 00)**
 - III: **21st Century action plan (Feb 01)**

* Prepared by Mini-Symposium Program Committee

THE ENVIRONMENT
Admiral Harry Train (Ret)
The US Commission on National Security/21st Century
SUMMARY (Cont'd.)

- **Commissioners' view of future (selected comments)**
 - **NGOs will grow in importance.**
 - **We will significantly outdistance our allies in technology and hence will have to do a lot on our own. Weapons of mass destruction and mass disruption will proliferate.**
- **Homeland defense increasing in importance: Greater probability of catastrophic terrorism.**

For more details see the website at <http://www.nssg.gov>

Preparing for QDR-01

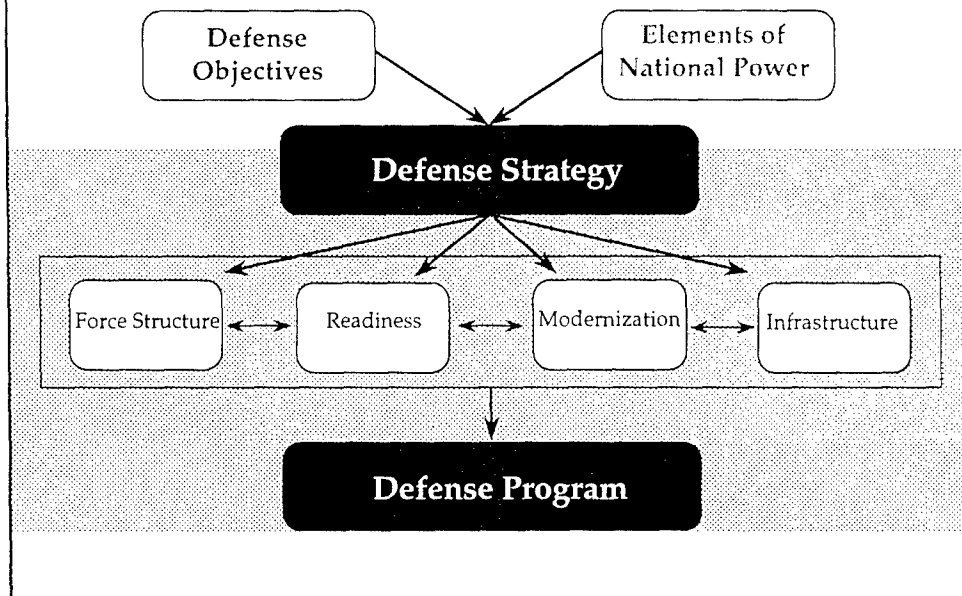


Andrew R. Hoehn
Deputy Assistant Secretary of Defense
for Strategy

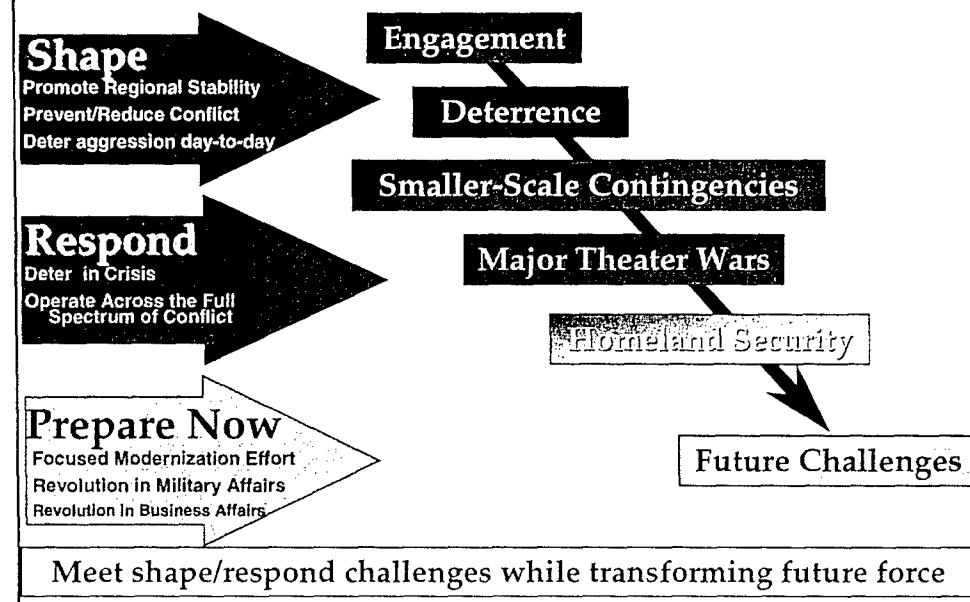
Balancing Ends and Means

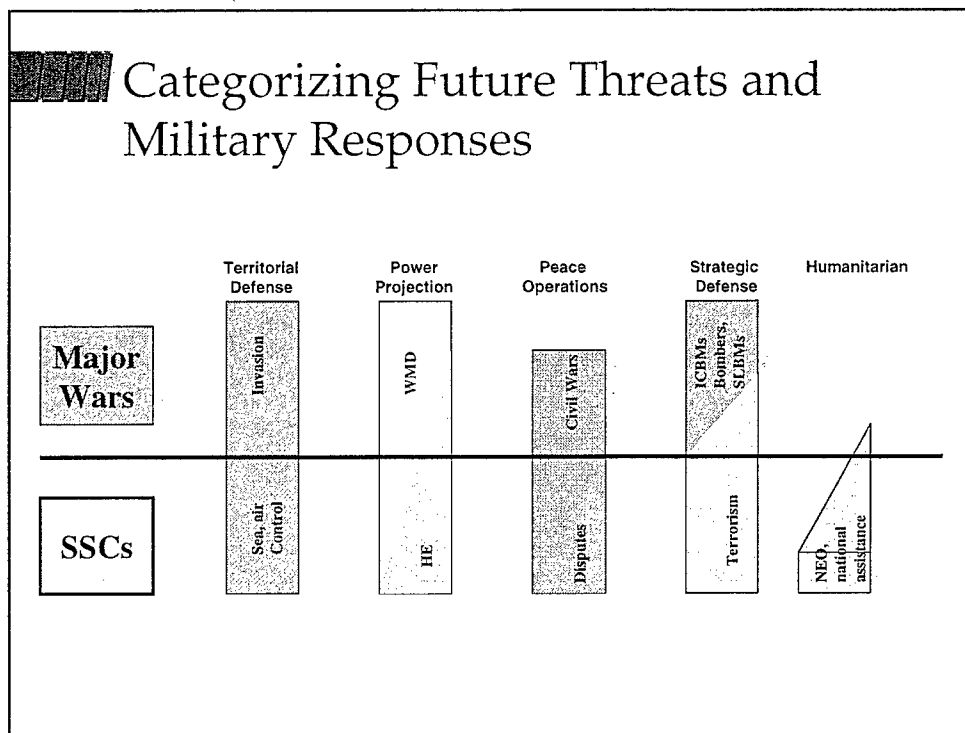


Translating Strategy Into a Balanced and Sustainable Defense Program



Current US Defense Strategy





Criticisms of Current Defense Strategy

1. Threat-Strategy Mismatch
2. Strategy-Forces Mismatch
3. Forces-Funding Mismatch
4. Over-stretch and Under-stretch

Developing Defense Strategy Alternatives

- Greater or lesser reliance on allies and coalitions?
- Greater or lesser focus on peacetime engagement activities, peace/humanitarian operations and crisis response?
- Enhanced or reduced readiness of forces for near-term major wars?
- Deliberate or accelerated transformation of forces and capabilities to meet future, more robust military challenges? Transformation for what?
- Greater DoD focus on civil support to protect US territory and populations?

Choices are not necessarily mutually exclusive!!

Where Should Strategy Take Risks? How to Strike Right Balance Among Missions?

	2005	2010	2015	
Major War				<u>Key Variables</u> <ul style="list-style-type: none"> • Definition of Interests • Threat Assumptions • Tempo • Versatility
Crisis Response Op				
Peacetime Engagement & Stability Support				

Current strategy seeks to minimize risks across the board

Key Strategy Issues for QDR-01

- National interests
 - Does current strategy's hierarchy of interests remain valid?
 - Changes in weightings of interests?
- International security environment
 - Should consider range of potential threats, likelihood, and consequences of occurrence
- Clear delineation of strategic priorities, required capabilities (and what's not required)
- Ability to ensure thorough coverage of emerging missions
 - Homeland security and DoD civil support
 - National missile defense
 - Info war, sustaining ops in CBW
 - Stability support
 - Crisis response
- Patterns of engagement and force management

Challenges for the Analytic Community

Need analytic tools to inform QDR-01 decisions, specifically:

Peacetime

Engagement/SSCs

- Prioritizing regional security objectives
- Measuring effectiveness of peacetime engagement
- Combined exercising
- Assessing long-term deployments
- Developing compellence models
- Use of force criteria for SSCs
- Effects of SSCs on MTW readiness

Crisis Response & War

- Re-defining MTWs
- MTW base case assumptions
- Improving MTW modeling to take account of information, NBC, coalition interoperability, etc.

Prepare to Meet Future

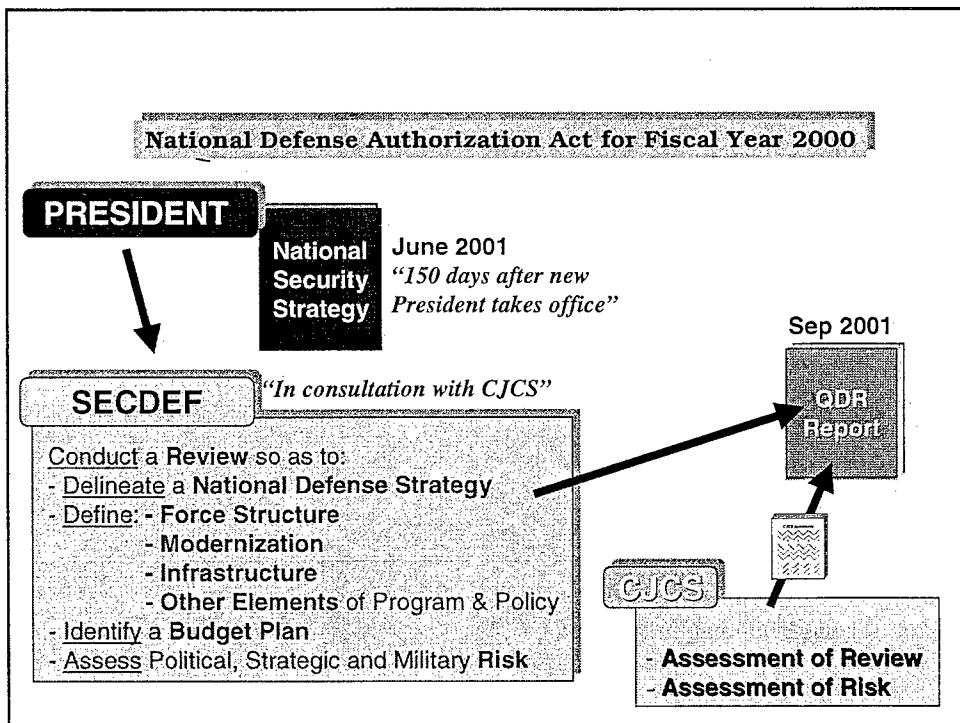
Threats

- Linkages between modernization and transformation
- Facilitating meaningful trade-offs among defense capabilities

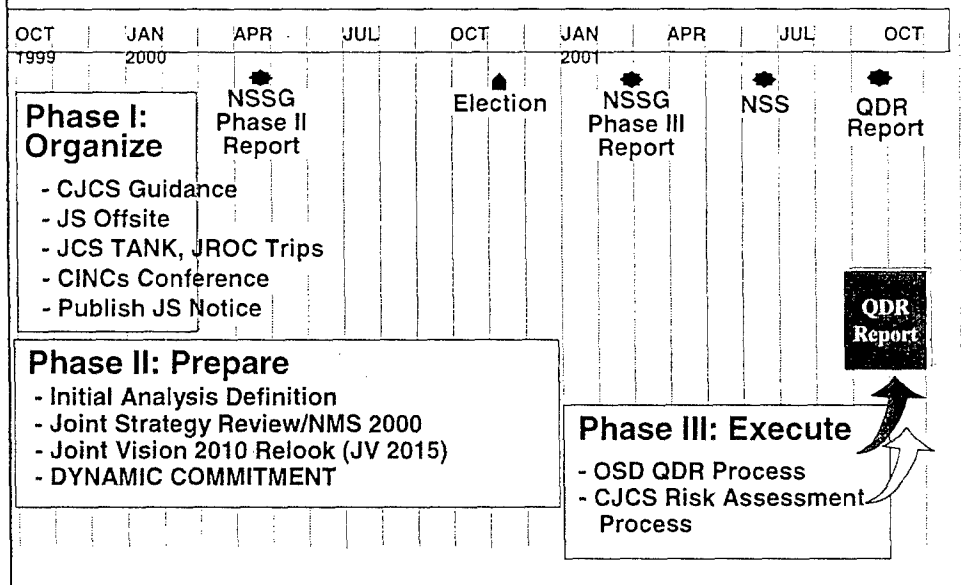
FY 2001 Quadrennial Defense Review

Joint Staff Road Ahead

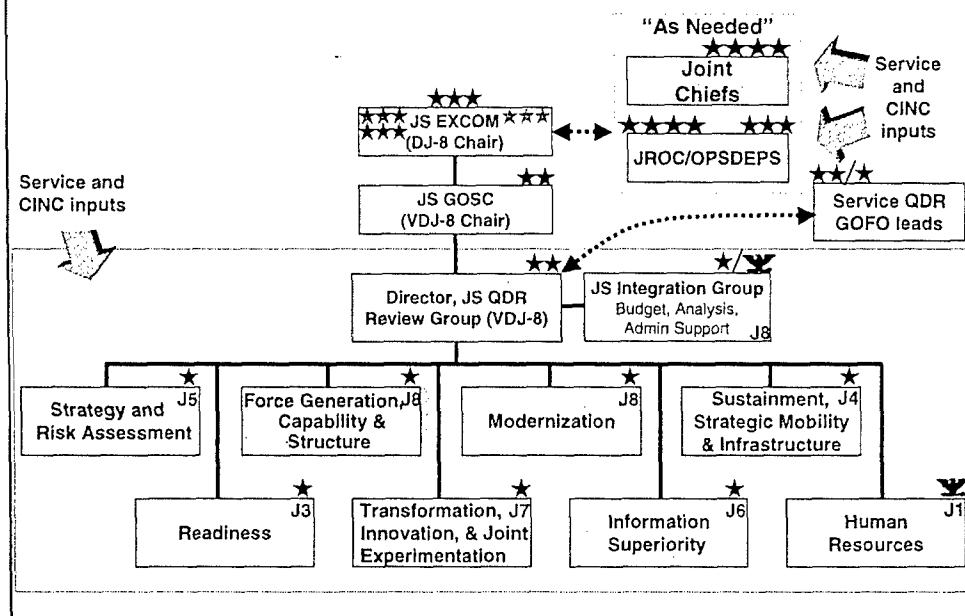
Vince Roske
Deputy Director, J8
Wargaming, Simulation and Analysis
Joint Staff



QDR Timelines/Milestones



JS QDR Organization (Prepare Phase)



PERSPECTIVES ON ANALYSIS # I

- THE PURPOSE OF ANALYSIS IS TO IMPROVE INSIGHT WITHIN THE DEBATE.
 - THE DEBATE IS ALWAYS AMONG THE STAKEHOLDERS.
- INSIGHT FROM ANALYSIS FLOWS BEST FROM THE “PROCESS” OF DOING THE ANALYSIS .
 - NOT FROM THE ANALYSIS “REPORT”.

THEREFORE:

- THE BEST ANALYSIS PROCESS HAS PARTICIPATION;
COLLABORATION AMONG THE “STAKEHOLDERS”.
 - DEVELOPING AND MATURING THEIR SHARED
INSIGHTS AS THE ANALYSIS PROGRESSES.

PERSPECTIVES ON ANALYSIS # II

- MODEL CENTRIC METHODOLOGY* IS THE DIRGE OF EFFECTIVE ANALYSIS.
- BEST ANALYSIS FOLLOWS AN *ANALYSIS RECIPE*:
 1. WHAT’S THE QUESTION?
 2. WHAT’S THE REAL QUESTION?
 3. WHAT MUST THE FINAL SLIDES LOOK LIKE?
 4. WHAT DO WE ALREADY KNOW?
 5. HOW DO WE GENERATE THE MISSING INFO?
(SURVEY,GAME, BACK OF ENVELOP, SIMULATION?)

Only the Last step involves picking tools (models) and this step may not be necessary to do an effective analysis.

Some Potential JS QDR Issues

Role of US Military

- What are costs, risks of what we do?

Force Structure

- Scenario-based planning...still viable?
- Is 2 MTW the right sizing convention?
- Impact of modernization?

Personnel

- Impact of economy on recruiting?
- Impact of changing attitudes toward military?
- Will demographics support force structure?

Reserve Component

- Role and size? Political support for change?
- Readiness and capabilities?

Enablers

- Incentives and metrics for change?
- What management mechanisms will DOD use?

Technology

- How do we discard legacy R&D?
- Can we embrace emerging technology faster?
- How do Space / C4ISR factor in our strategy?

Strategy

- Capability-based? Threat-based?
- Combination?

Budget

- Topline: up, down or same?

Near vs. Far Term

- Balance between R&D and procurement?
- How do we quantify risk?

Modernization/Recapitalization

- What are the strategy-based requirements?
- What is affordable? Bill payers?

Agencies

- Number and size

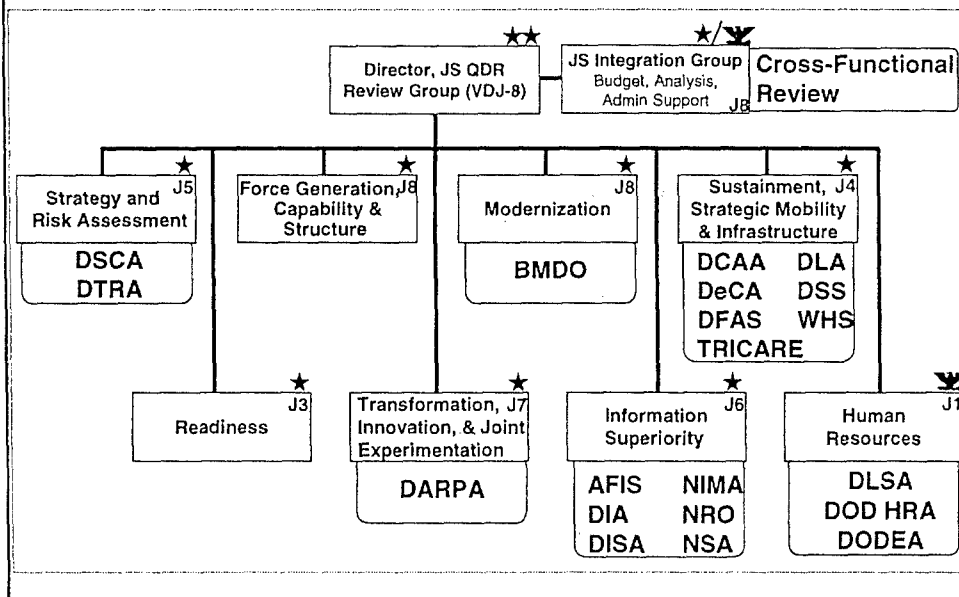
Infrastructure

- Political support for change?
- Possibility of new BRAC?

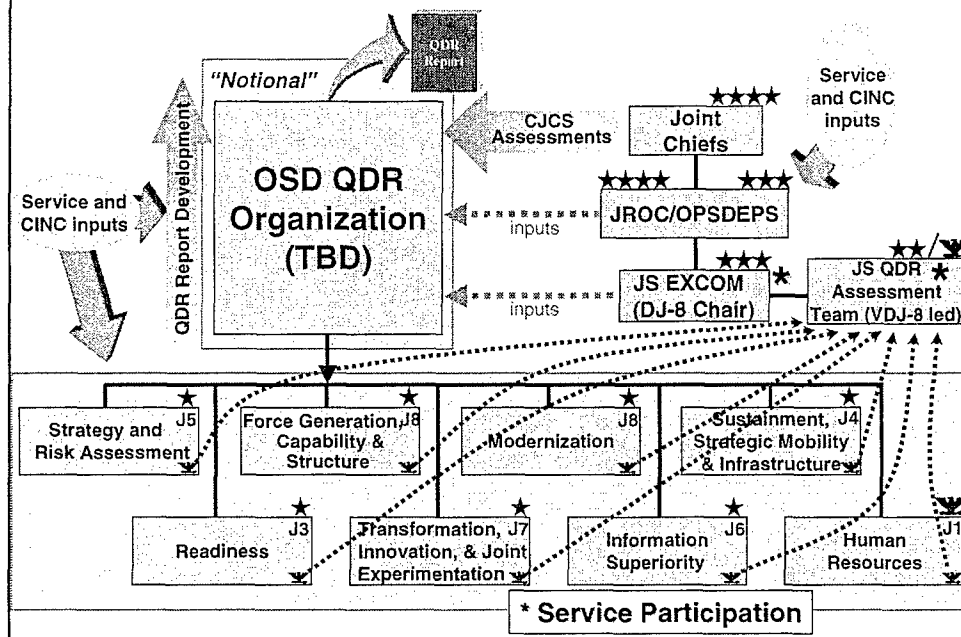
Departmental "Fratricide"

- How can we avoid it among Services?
- ...between active and reserve?

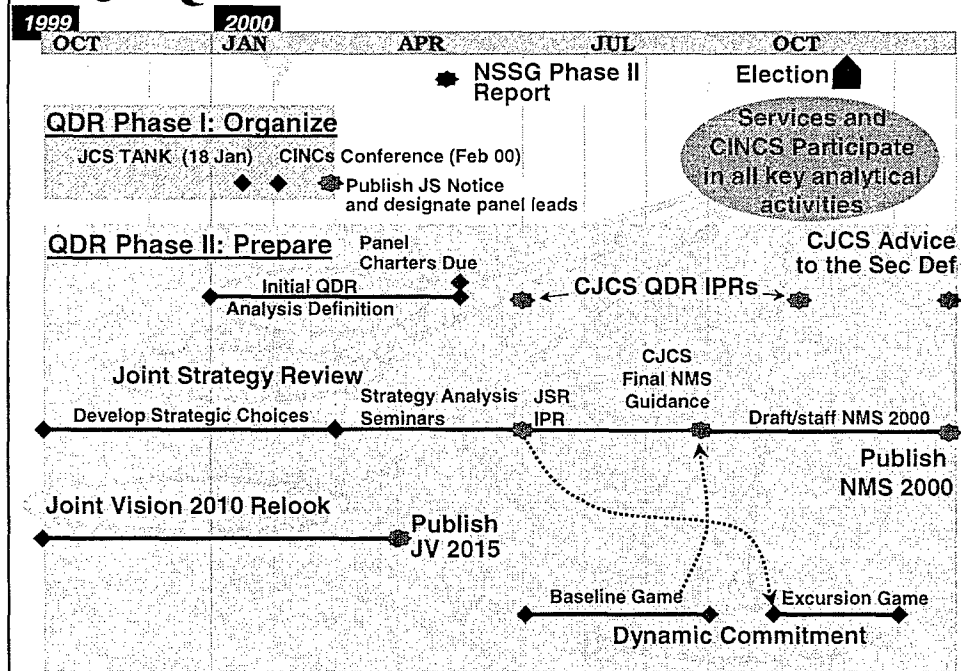
JS QDR Defense Agency Review

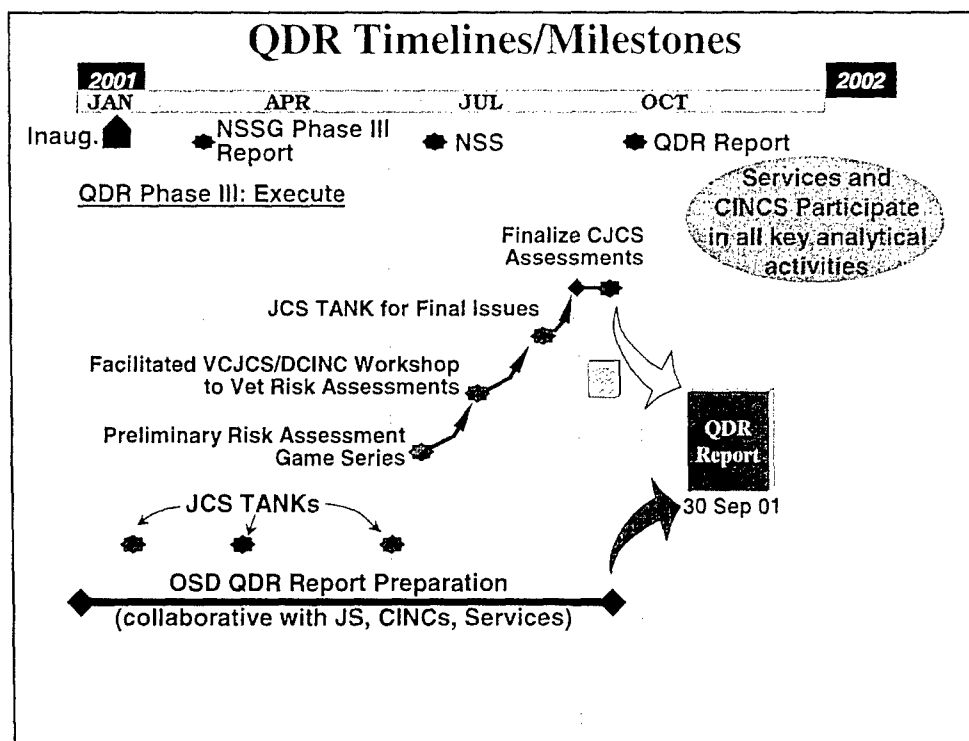


JS QDR Organization (Execute Phase)



JS QDR Process Phase II Timeline





Joint Staff QDR Objectives

- Develop a QDR process that will shape defense policies
- Ensure the process is strategy-based, not budget-based
- Define a force structure responsive to the national military strategy...including plans for modernization, infrastructure, and resources

Analytical Perspective

Mr. Jim Johnson
OSD/PA&E

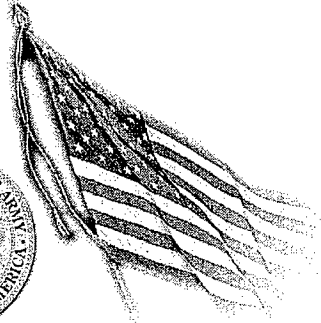
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Army QDR Overview



MG Robert St Onge

Director, Strategy, Plans, Policy

Unclassified

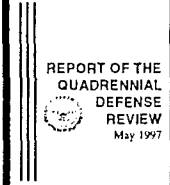
On Point for the Nation . . . Persuasive in Peace, Invincible in War

Agenda

- ◆ QDR '97 Perspectives
- ◆ Army Transformation
- ◆ QDR '01 Preparations
- ◆ Analytic Challenges

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Army Related QDR 97 Findings



**REPORT OF THE
QUADRENNIAL
DEFENSE
REVIEW
May 1997**

QDR 97 LEFT ARMY PROGRAM UNBALANCED:

"Although these actions [accelerated fielding of digitized corps and completion of Army National Guard Redesign more quickly] will improve the Army's longer-term investment program, additional measures will be required to achieve a balanced modernization program."

"In the middle of the next decade, the RAH-66 Comanche helicopter and the Crusader self-propelled howitzer will enter production. Our review reaffirms that both systems are necessary to the Force XXI concept."

"Savings from planned Army personnel reductions alone will be insufficient to support both programs. Additional funds from sources such as base realignments and closures are critical to procuring these systems on the projected schedule."

STRATEGY
Shape, Respond, Prepare Now

2 MTWs

Recognition of SSCs

MODERNIZATION

Force XXI

2001

2004

READINESS

SEN McCain

R-AZ

Tied

FORCE STRUCTURE

ADRS ... 2013 → 2009

AC 15K, RC 45K, ARNG 16.7K

INFRASTRUCTURE

BRAC ... 1999 & 2001

On Point for the Nation... Persuasive in Peace, Invincible in War

QDR 97 ... Successes

Keys...

- Army QDR Organizational Structure...mimicked OSD/JS
- Army Analytic Approach...indepth, integrated, innovative
- Telling the Army Story...informed key audiences of Army capabilities

... Results

- Led to responsive, quick turnaround assessments
- Quantified impact of SSC requirements on OPTEMPO, PERSTEMPO, readiness and risk to MTW
- Quantitative analytic effort validated Army force structure requirements..
- OSD/JS/Congress received new insights into total Army force requirements

On Point for the Nation... Persuasive in Peace, Invincible in War

QDR 97 ... Lessons ~~Re~~-Learned

Strategy must be the driver...

- Early identification of information/data and analysis requirements is important
- Solutions must be militarily sound and economically feasible
- Army objectives must be defined up front and understood by all
 - Integration of functional areas is difficult...but essential
 - No ideal models are available... work with what exists
 - Army must work together as "The Army"
 - Participation of Senior leadership is key
 - Joint solutions are preferred

But ultimately ... IT'S ABOUT RESOURCES

On Point for the Nation . . . Persuasive in Peace, Invincible in War

Agenda

QDR '97 Perspectives

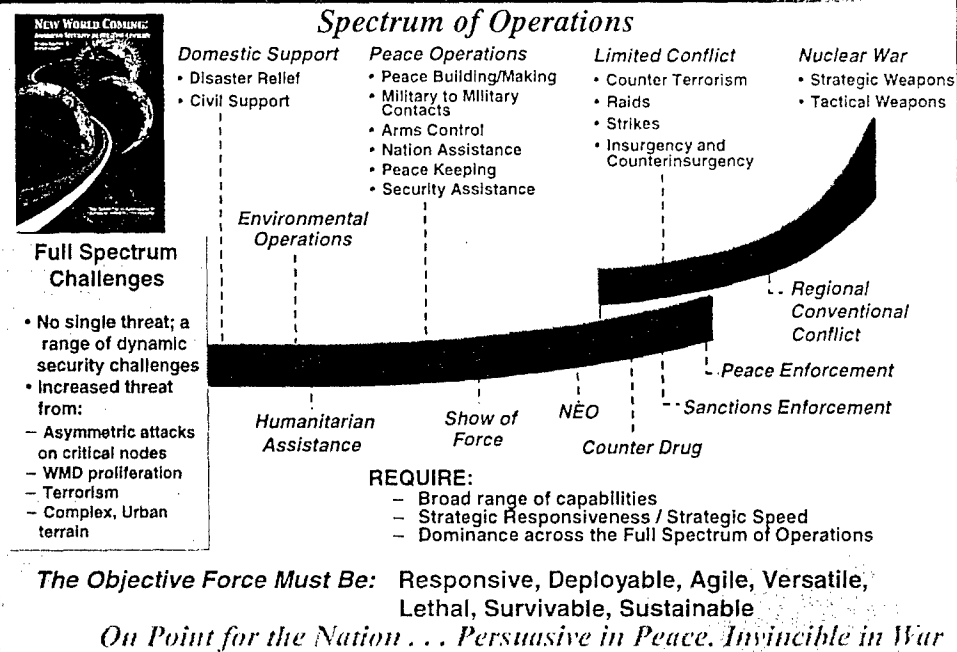
◆ Army Transformation

QDR '01 Preparations

Analytic Challenges

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21st Century Security Requirements



Strategic Vision Development

STRATEGIC FACTORS



National Security Strategy

- Fundamental goals endure
- World remains volatile, uncertain, complex, ambiguous
- Unbounded, full spectrum challenges
 - Failed and failing states
 - Regional or state-centered threats
 - Transnational threats
 - Asymmetric threats
 - Rise of a major military competitor?

National Military Strategy

- Shape
- Respond
- Prepare Now



21 CHALLENGES
FOR THE
21st CENTURY

Joint Vision 2015

Full Spectrum Dominance

- Dominant Maneuver
- Precision Engagement
- Full Dimensional Protection
- Focused Logistics



On Point for the Nation . . . Persuasive in Peace, Invincible in War

Strategic Vision Development

It is the direct, continuing, and comprehensive control over land, resources, and people that allows landpower to make permanent the otherwise transitory advantages achieved by air and naval forces.

ARMY's STRATEGIC PURPOSE UNCHANGED

Prompt, Sustained Land Dominance

- COMPEL ENEMIES
- REASSURE ALLIES/PARTNERS
- DETER POTENTIAL ADVERSARIES
- SUPPORT DOMESTIC COMMUNITIES

PART OF
**INTERDEPENDENT
OPERATIONS IN A
COMBINED JOINT
INTERAGENCY
TASK FORCE
ENVIRONMENT**

ARMY MISSION AREAS

Full Spectrum Requirements

- Deploy, Fight, and Win Major Theater War
- Promote Regional Stability
- Reduce Potential Conflicts and Threats
- Deter Aggression and Coercion
- Conduct Small-Scale Contingencies (SSC)
- Support Homeland Defense
- Provide Domestic Support to Civil Authorities

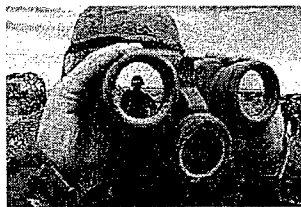
... Persuasive in Peace, Invincible in War

Why We Must Change

Existing force structure and supporting systems were designed for a different era and enemy; lack the capability to operate optimally across the full range of operations our Nation is calling on the Army to perform.



Heavy forces need to be more versatile with reduced logistical footprint.



Light forces need increased lethality, mobility and survivability.

- Achieve Full Spectrum Deterrence with a demonstrated capability
- Provide the NCA with a full range of Landpower options
- Achieve greater simultaneity for large-scale operations
- Deny an adversary's political and military objectives before he attains them
- Provide America the capability to shape the strategic environment

On Point for the Nation . . . Persuasive in Peace, Invincible in War

Enduring Truths

What will not change:

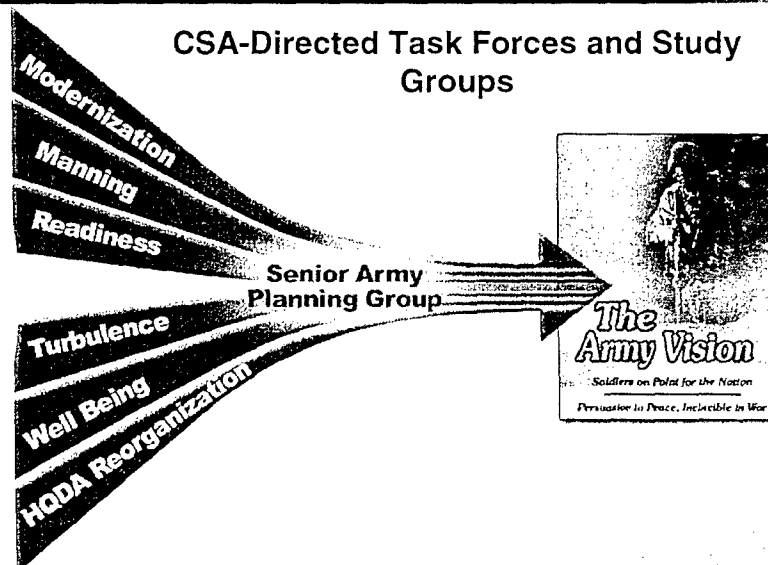
The Army will remain a professionally rewarding and personally enriching environment within which people take pride in being part of the Nation's most highly esteemed institution.

We will not fail in fulfilling our non-negotiable contract with the American people — fighting and winning our Nation's wars.

The Army's Strategic Vision is about Transformation...and taking care of People and preserving Readiness

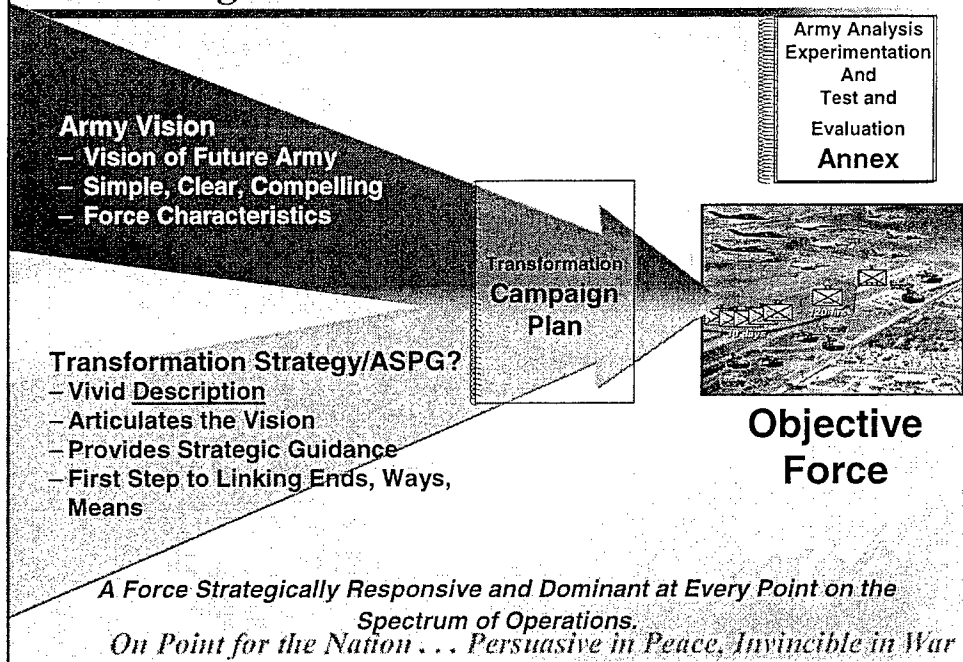
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The Vision Process

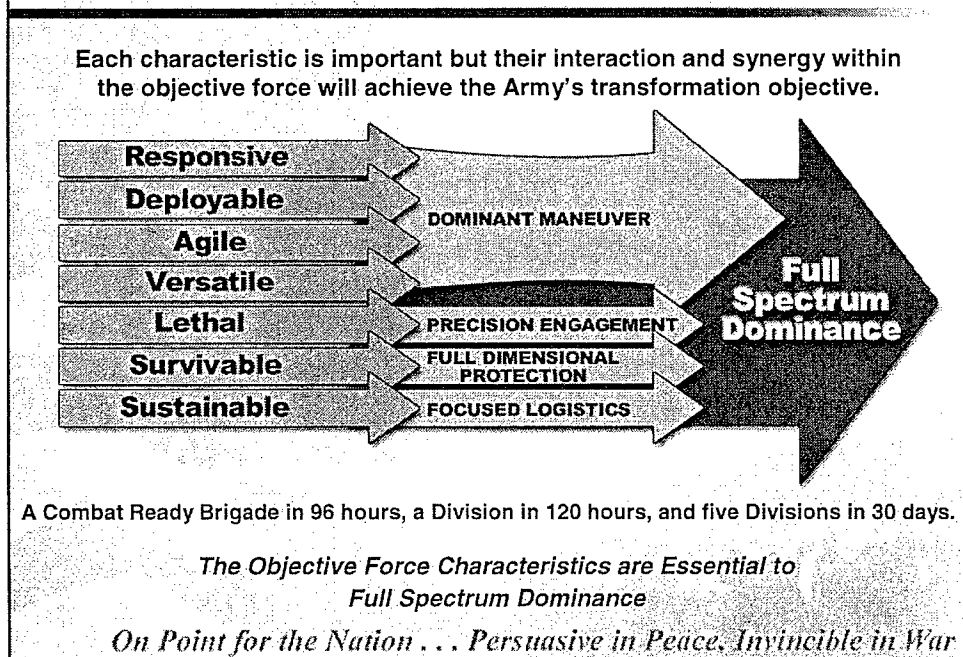


SecArmy/CSA Tapped Into the Entire Army to Develop the Vision
On Point for the Nation . . . Persuasive in Peace, Invincible in War

Achieving the Vision

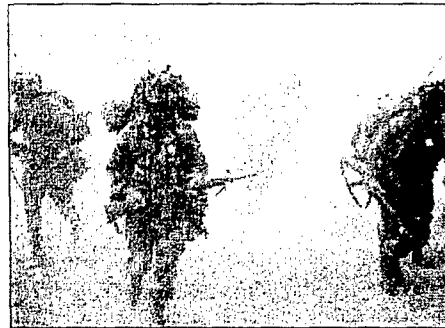


Force Characteristics in a Joint Context



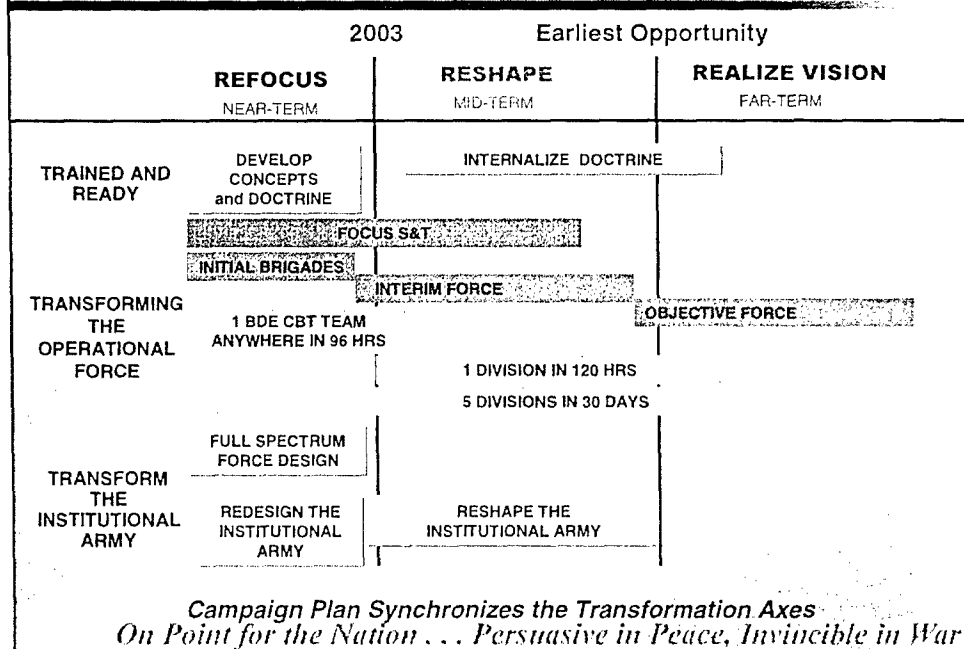
Moving Out

- Brigade conversion at Fort Lewis
- S&T exploration
- Manning the Force
- Transformation Campaign Plan



On Point for the Nation . . . Persuasive in Peace, Invincible in War

Achieving The Transformation Over Time



Initial Brigades . . .

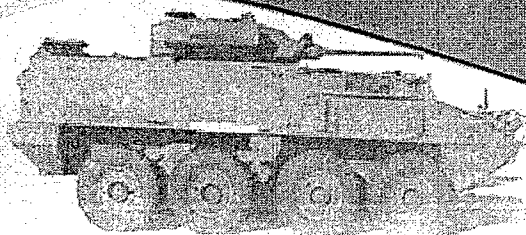
Acquire
Vehicle Prototypes

Transition 2 Brigades
at Ft. Lewis, Washington

Develop Doctrine

Shape
Organizational Design

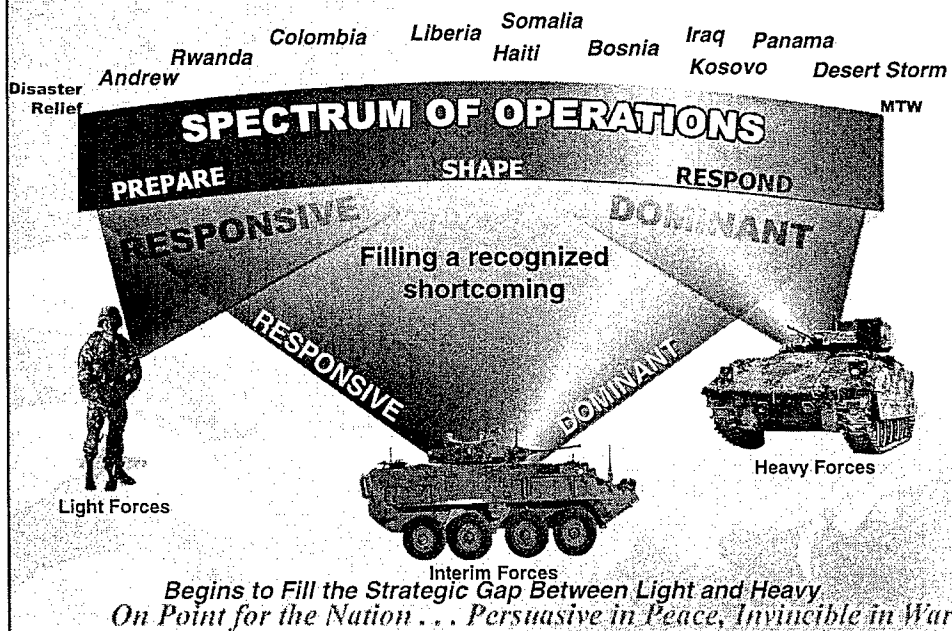
Train Leaders



Validate the Concept Within A Joint Context - JV20XX

On Point for the Nation . . . Persuasive in Peace, Invincible in War

The Interim Force . . .



The Objective Force . . .

A Multidimensional Force

Peace Operations

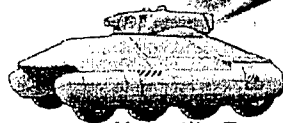
Humanitarian Assistance

Disaster Relief

CYBER ATTACK

CIVIL SUPPORT

?



SPECTRUM OF OPERATIONS

Prepare Shape Respond

NEAR PEER

Opposed Intervention

?

?

Show of Force

?

Major Theater War

Counter Terrorism / Drug

?

WMD THREATS

Non-Combatant Evacuation

Versatile Enough to Handle Missions Across the Breadth and Depth of the Spectrum

On Point for the Nation . . . Persuasive in Peace, Invincible in War

Agenda

QDR '97 Perspectives

Army Transformation

◆ QDR '01 Preparations

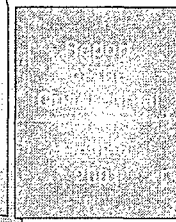
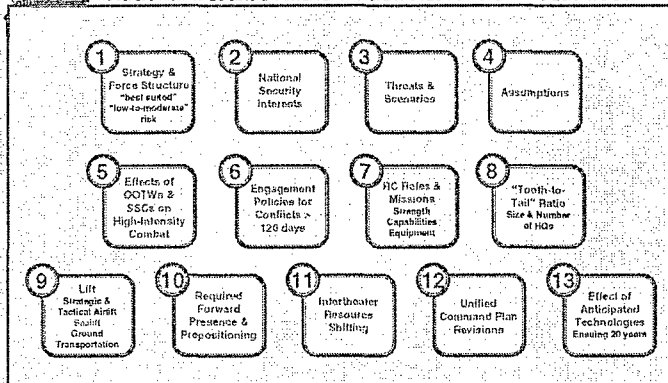
Analytic Challenges

On Point for the Nation . . . Persuasive in Peace, Invincible in War

QDR 2001 — The “13 Questions”



National Defense Authorization Act for Fiscal Year 2000



On Point for the Nation . . . Persuasive in Peace, Invincible in War

NLT 30 Sep 01

Army QDR Planning Starts With ...

The Army Vision

CSA Vision

“Soldiers on point for the Nation transforming this, the most respected Army in the world, into a strategically responsive force that is dominant across the full spectrum of operations.”



- 1 Bde in 96 hrs
- 1 Div in 120 hrs
- 5 Divs in 30 days

Strategic Responsiveness
Across the
Entire Spectrum of Operations!

Current Force Closure
Requirements as Validated
by MRS BURU

Outdated

- 1 Light Brigade by C-4
- 1 Light Division by C-12
- 1 Heavy Brigade Afloat by C-15
- 2 Heavy Divisions from CONUS by C-20
- 5 Division Contingency Corps with CSS by C-75

On Point for the Nation . . .

ar

Army QDR Assumptions...

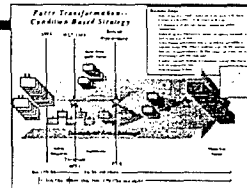
Primarily The QDR Will

- Be Strategy based and resource constrained
- Focus on the total range of requirements across the full spectrum of conflict
- Seek to maximize Services' capabilities in support of the National Military Strategy

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QDR 2001 — Army Objectives

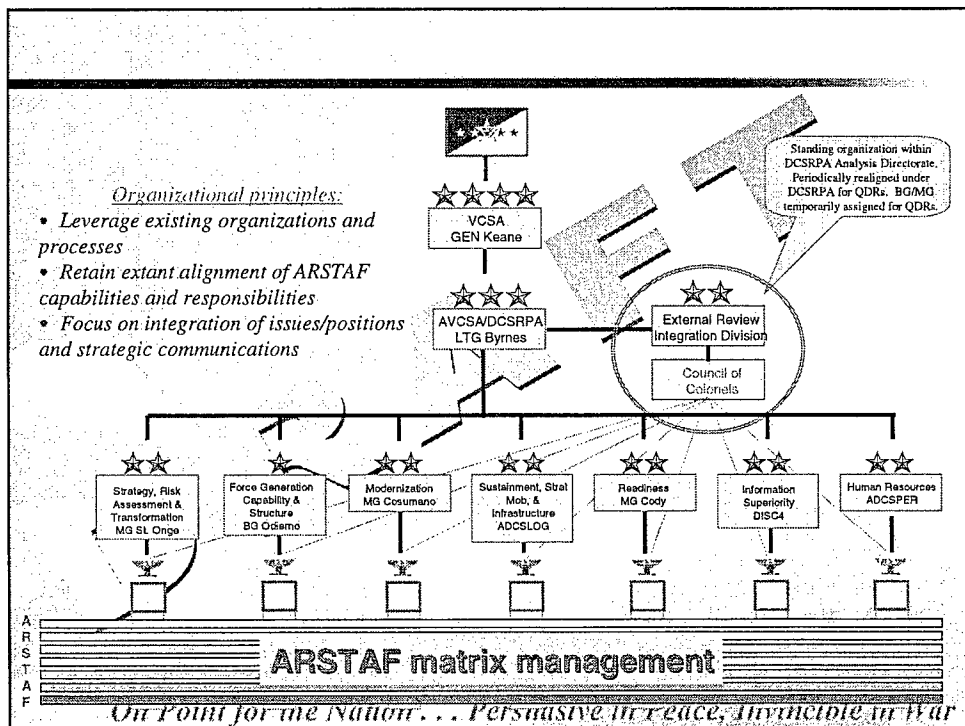
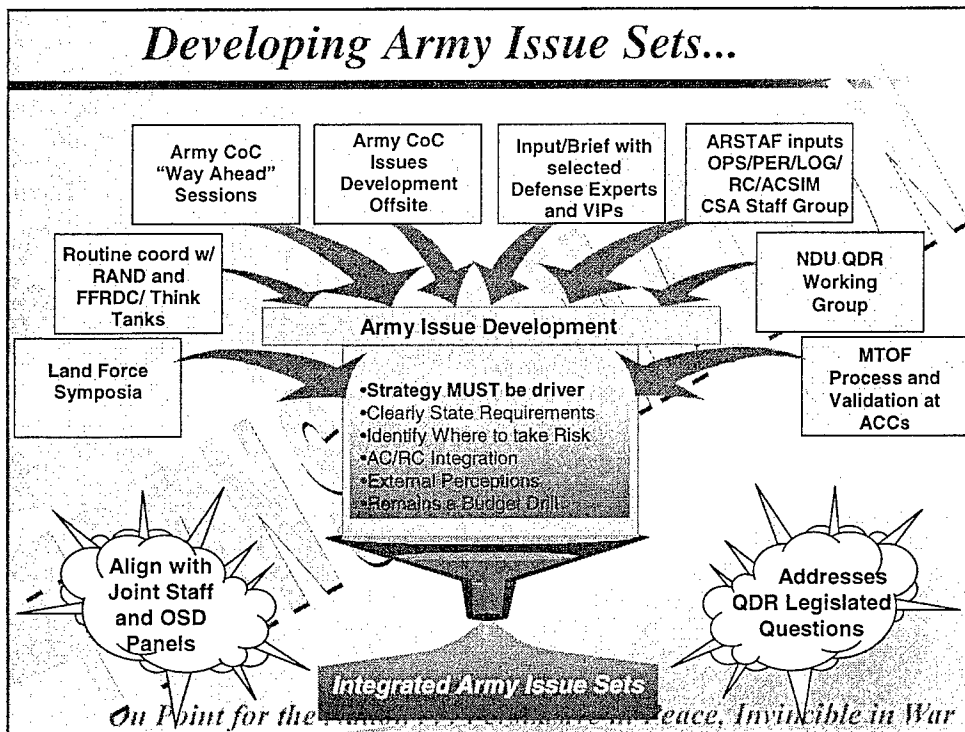
⇒ *Transformation is the centerpiece! Gain Congressional and DOD support for Army transformation objectives and requirements (including resources)*



- ⇒ Demonstrate *value of land forces* across the full spectrum of military operations
- ⇒ Make the Army's case for *requirements and resources* -- base all work on strategy
- ⇒ *Ensure* Army authorized *personnel endstrength and force structure* are adequate to meet strategy-based requirements and achieve PERSTEMPO objectives (including improved HD/LD posture)
- ⇒ Clearly articulate Army's contribution to SSC's and the impact of these efforts on *readiness*
- ⇒ Identify and resource required concepts and capabilities for *Homeland Defense*

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Developing Army Issue Sets...



QDR Cooperation...

Services, Joint Staff and OSD Cooperation and Collaboration
Should Maximize Synchronization and Integration of...

- Scenarios
 - Analytical Tools
 - MOE and Metrics
 - Methodologies
 - Data and Information

Resulting in a Collaborative Effort to Produce....

A Joint Mission Capabilities Baseline That Is Available For All Joint
And DoD Analyses. This Baseline Could Adequately Represent Joint
Capabilities For All Levels of War, Operations, Missions And Tasks.

On Point for the Nation . . . Persuasive in Peace, Invincible in War

Agenda

QDR '97 Perspectives

Army Transformation

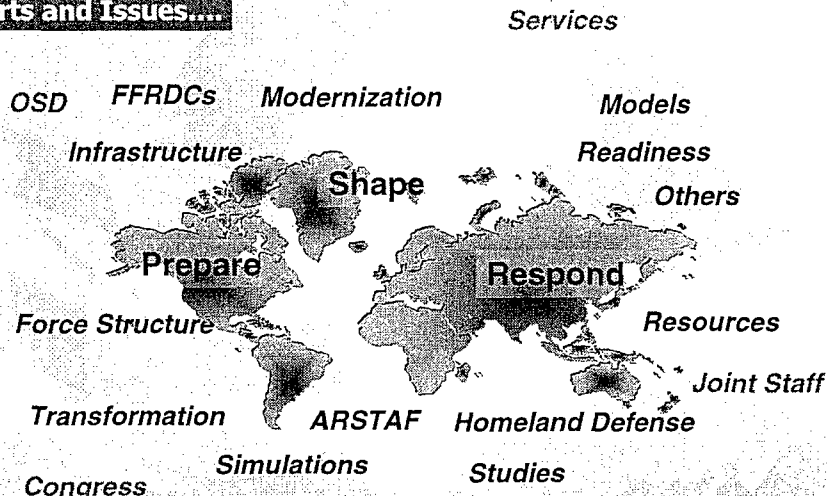
QDR '01 Preparations

◆ Analytic Challenges

On Point for the Nation . . . Persuasive in Peace, Invincible in War

Analytic Challenge...

**Many Analytic
Efforts and Issues....**



...Requiring Coordination, Integration, Prioritization

On Point for the Nation . . . Persuasive in Peace, Invincible in War

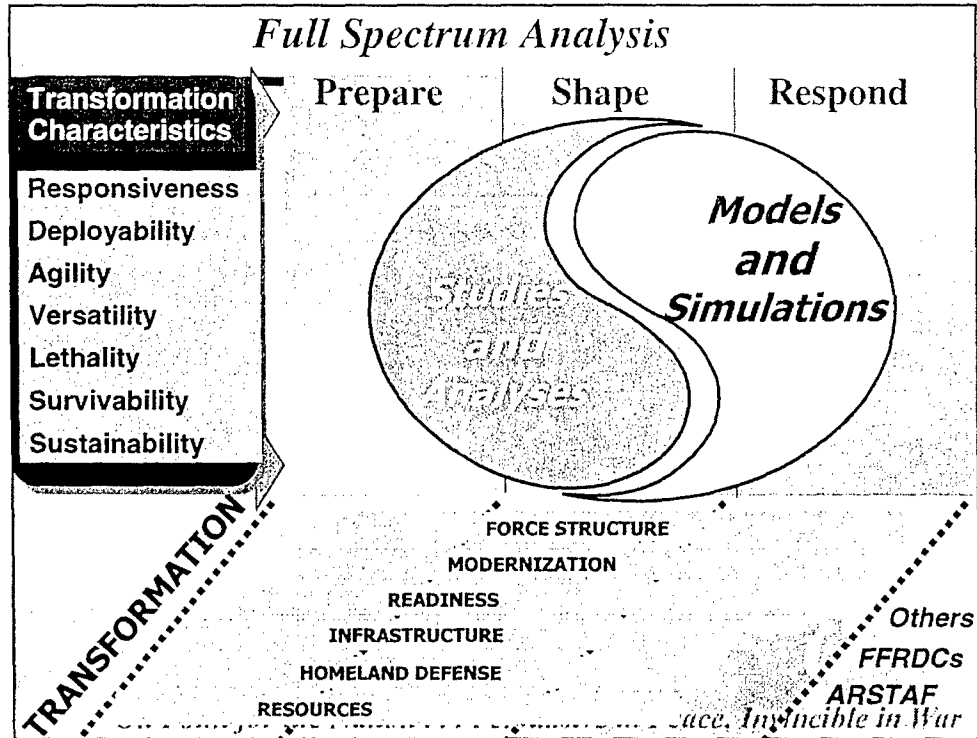
Analytic Gameplan

- Army Senior Analysts Advisory Group provides analytical oversight, advice and coordination
- We have good understanding of models available and strengths/weaknesses of each
- Leverage on-going analyses and shape pending analyses to inform Army on possible QDR issues
- Service and OSD analysts have been meeting for over a year to reach consensus on models

Bottomline

- ✓ Conduct indepth and focused analyses by integrating and coordinating total operational and analytical effort

On Point for the Nation . . . Persuasive in Peace, Invincible in War



How You Can Help

- ◆ Serve as a communication and coordination agency across the Services, JS, OSD
- ◆ Promote analytical integration across the Services, JS, ODS
- ◆ Assist in identifying analytical tools relevant to QDR issues that span the full spectrum of conflict
- ◆ Assist QDR community in leveraging unique capabilities

On Point for the Nation . . . Persuasive in Peace, Invincible in War

Summary...

Army Strategic Vision and Transformation are the overarching "lines of operations" for executing QDR '01

- ✓ QDR '97 resulted in successes and lessons learned that must be leveraged
- ✓ Preparations for QDR '01 must be early, integrated and focused
- ✓ Analytic effort must be synchronized with operational plan
- ✓ Analytic effort must be indepth, integrated and relevant

On Point for the Nation . . . Persuasive in Peace, Invincible in War

Questions?

On Point for the Nation . . . Persuasive in Peace, Invincible in War

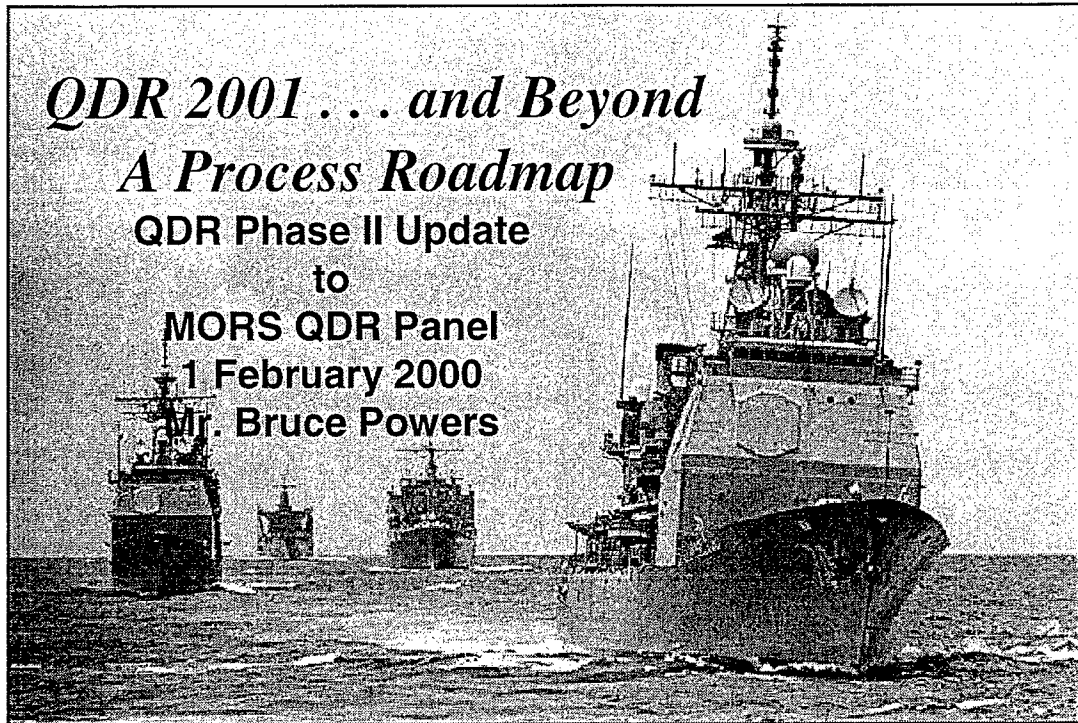
QDR 2001 . . . and Beyond *A Process Roadmap*

QDR Phase II Update
to

MORS QDR Panel

1 February 2000

Mr. Bruce Powers



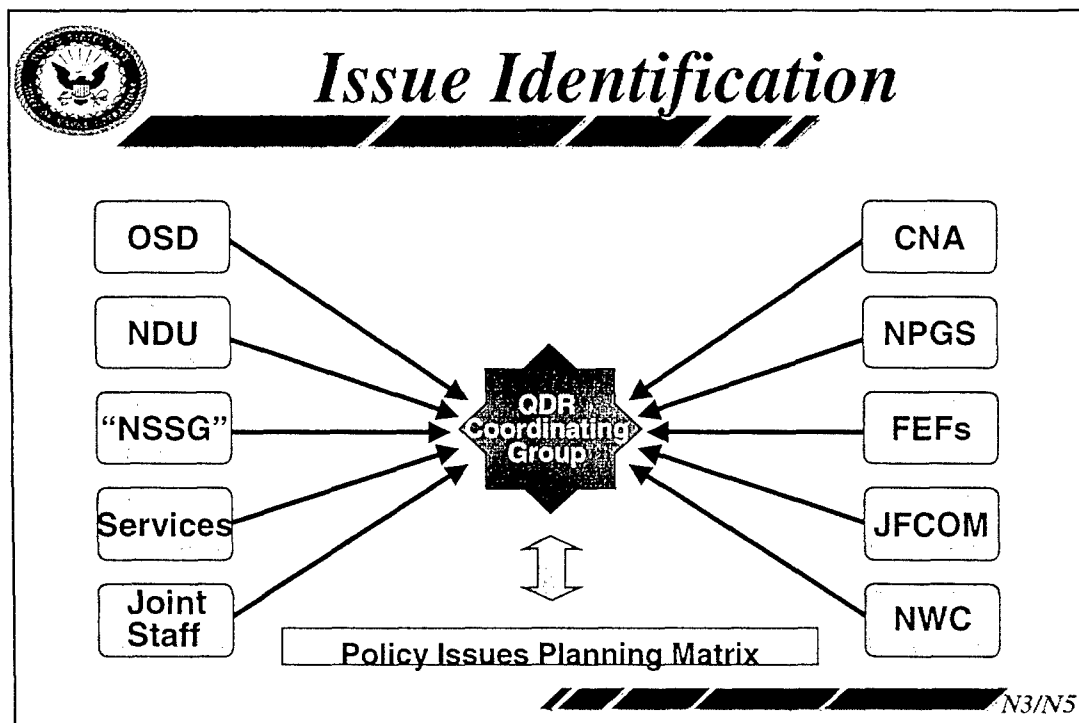
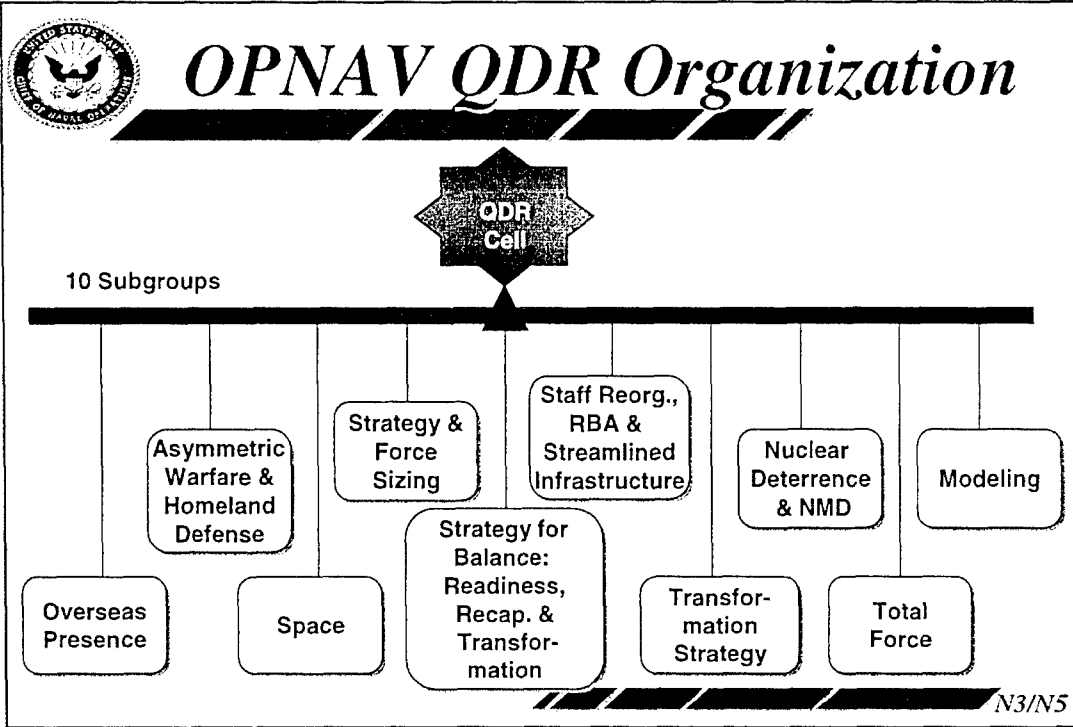
Outline

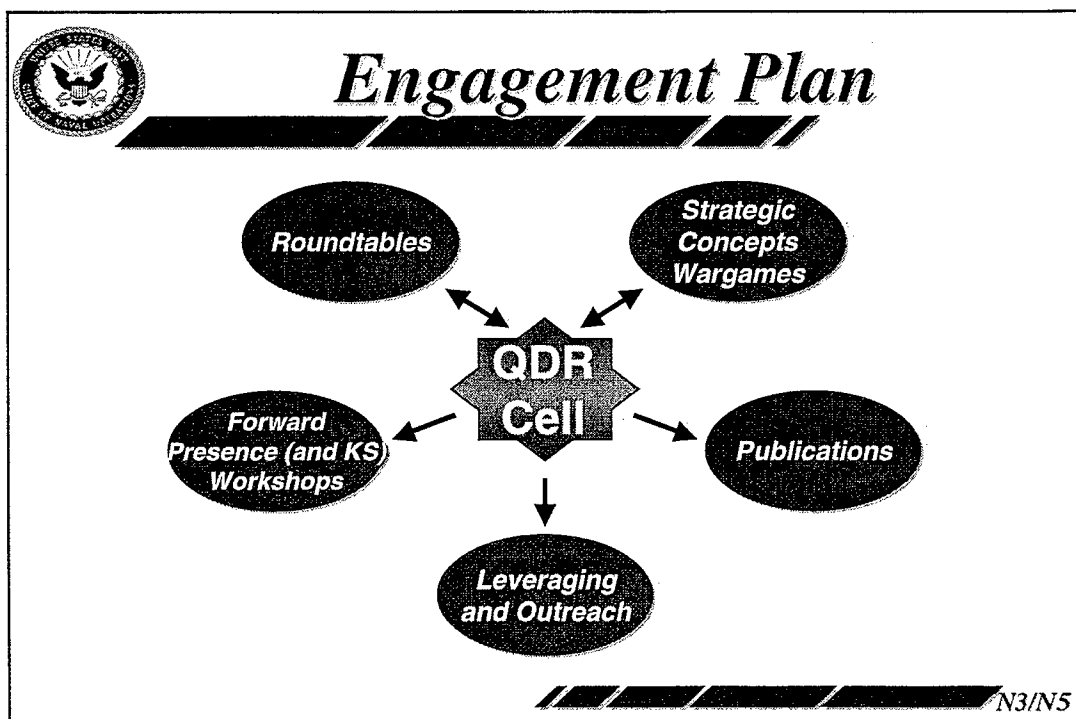
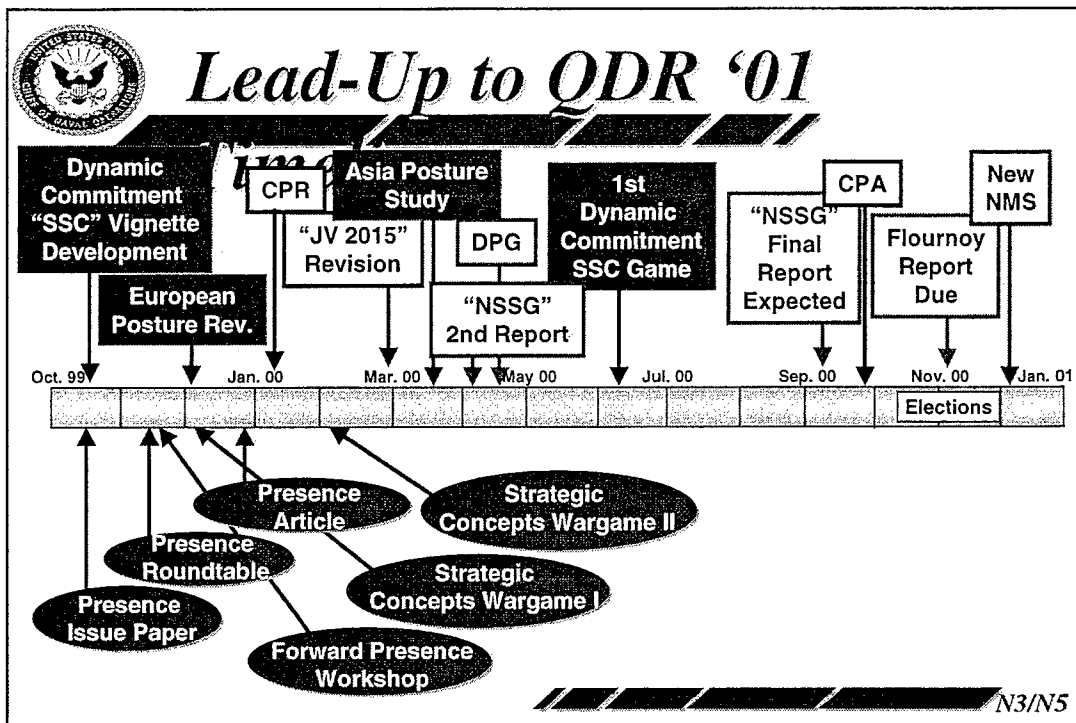
- Where we are
- Where we're going

The Bottom Line

We are executing a plan to position the Navy for
QDR '01... with a coherent message

/// N3/N5

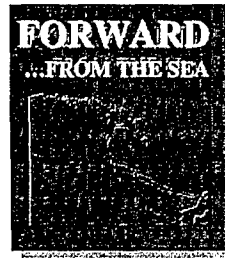
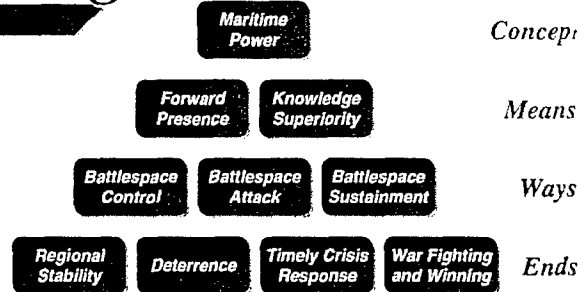






Strategic Plan

*A Maritime
Concept for the
Information Age*



N3/N5



N81 Efforts

- Modeling capabilities
 - Joint Campaign Analyses
 - MTW (including RT-2 & RT-5), SSC, MOOTW
 - Force Sufficiency Across the Spectrum
 - Global Naval Force Allocation
 - Support of JWARS Effort
- IWAR
- Participation in N51 Working Group

N3/N5



Outline

- Where we are
- Where we're going

The Bottom Line

We are executing a plan to position the Navy for
QDR '01... with a coherent message

N3/N5



QDR Themes

- Through combat-credible presence forward, the Navy provides our nation the means for both continuous shaping and timely response to crises.
- The Navy's transformation into a knowledge-superior force enables it to dictate the operational tempo across sea, air, land, space, and cyberspace -- an expanded battlespace.
- New mission areas, such as TMD and land attack, drive both new capabilities and additional capacity.

Maritime Power

Numbers Count

Knowledge Superiority

Maritime Power

Forward Presence

Sensors and Networks

Project Defense

Assured Access

Influence Ashore

Sea-Based C² and Logistics

N3/N5



Backup

N3/N5



Roundtables

- **Objectives**
 - Present Navy rationale to “larger” Defense Community
 - “Early look” at criticism/counter-arguments of Navy positions
 - Gain supporters / “defuse” adversaries
- **18 Roundtables Scheduled**
- **Contact List of 240+**
 - Think tanks
 - Academia
 - OSD/Joint Staff
 - Media
 - Others...

N3/N5



Publications

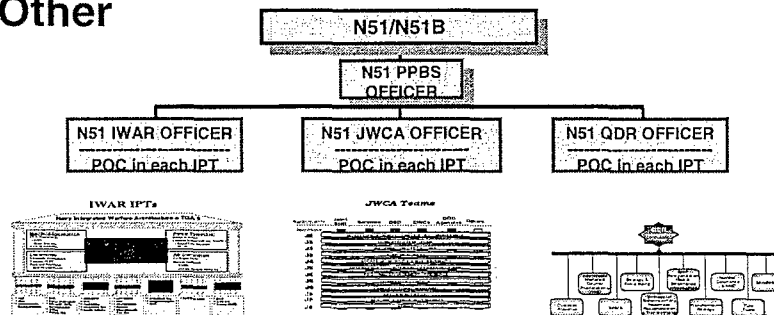
- Have Full-time “PAO” (plus one)
- Monthly Articles Submitted by Working Groups
- 14 Articles and Interviews Published to Date
- “The Show”
 - A targeted publication plan
 - Divided publications into four groups (Navy-oriented, academic, general news, “adversarial”)
 - Identified and called over 40 select editors/journalists
 - Established liaison
 - Determined interest in type of articles

N3/N5

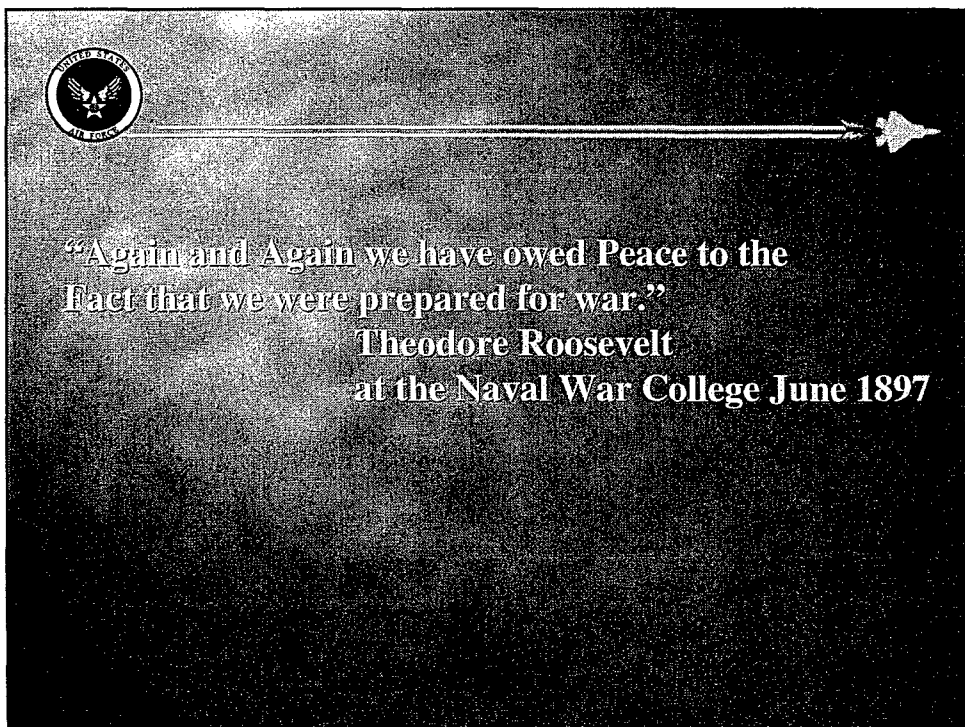


Leveraging and Outreach

- Studies Initiatives
- Outreach to Other Services Flag/AO Level
- Outreach to OSD/Joint Staff
- Other



N3/N5





"It is not whether you win or lose ...
it's how you play the game."

Grantland Rice



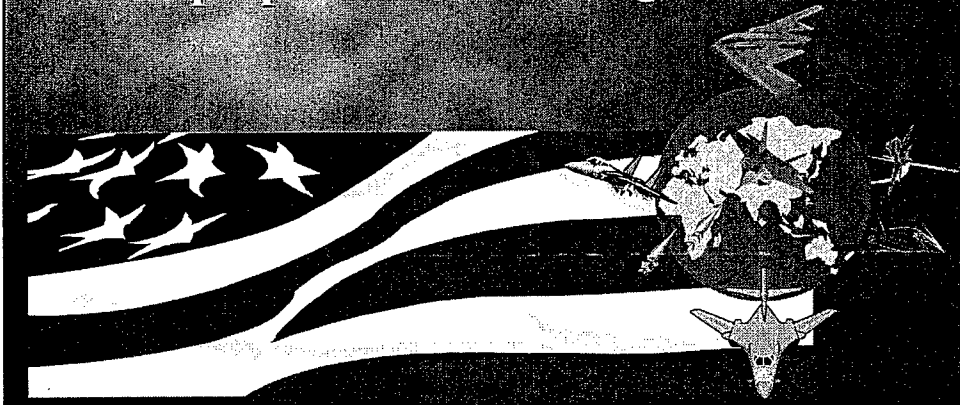
"Grantland Rice can go to hell as far as I am concerned."

Gene Autry



WHY AM I HERE?

- To share insights on the challenges and evolution of Aerospace Forces as we prepare for the next QDR



Aerospace Forces: Challenges and Evolution

Cold War Air Force

21st Century Air Force

Containment

Engagement

Large Force
Structure

1/3 Less
People

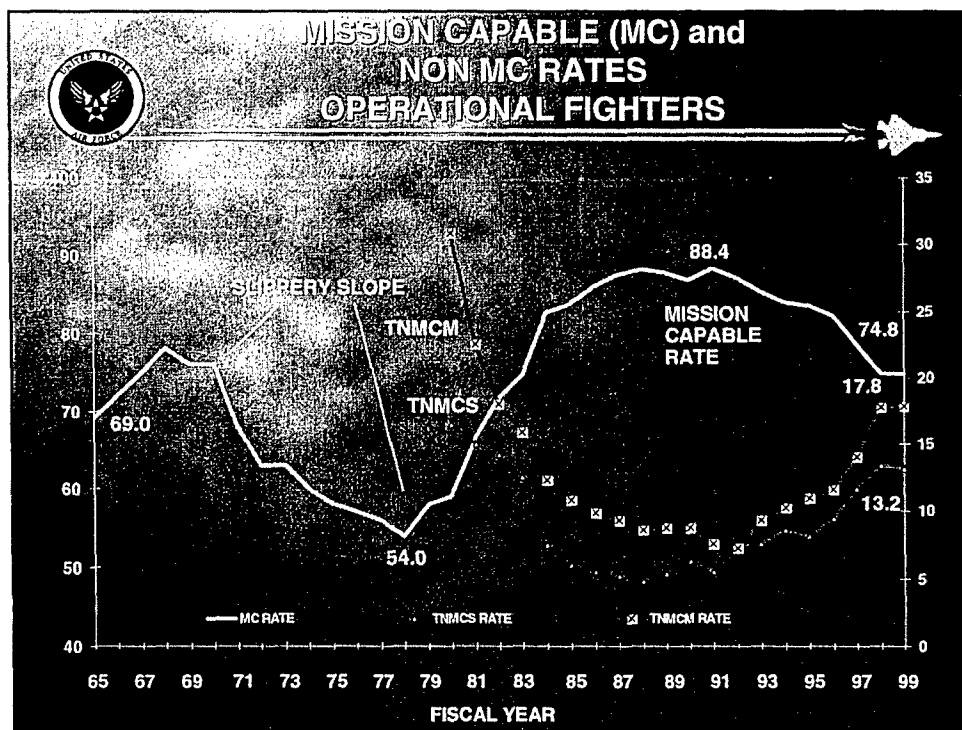
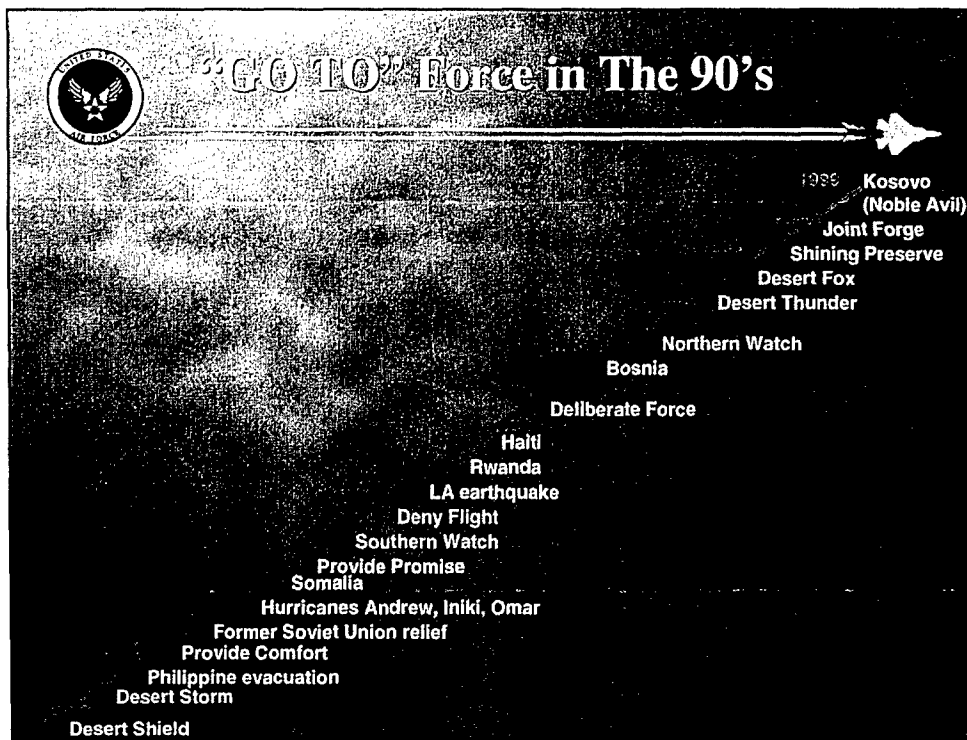
40% Less
Force Structure

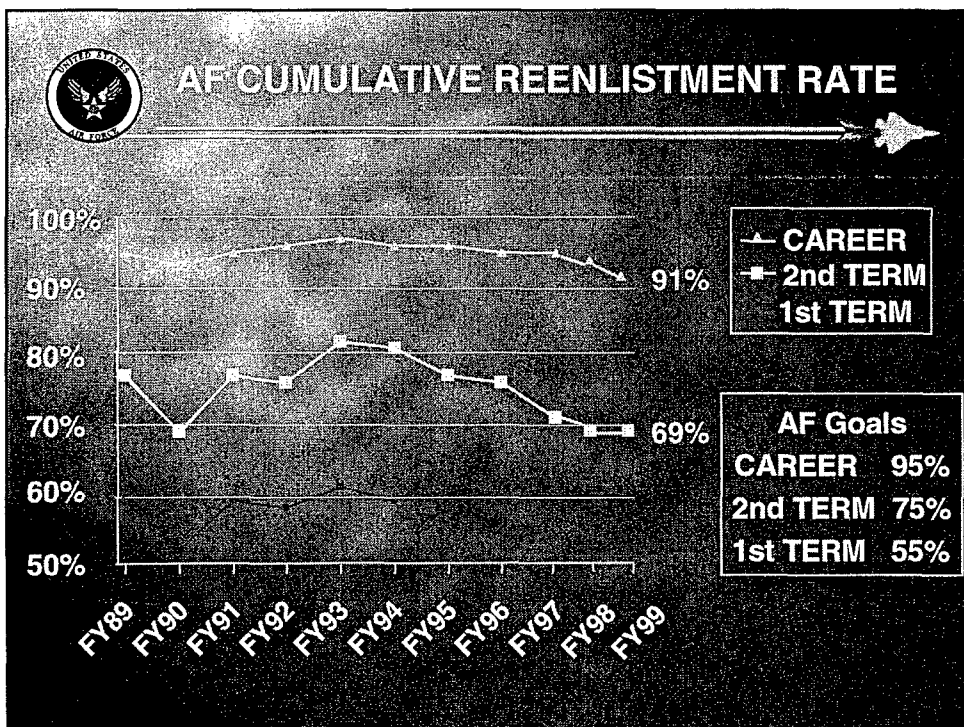
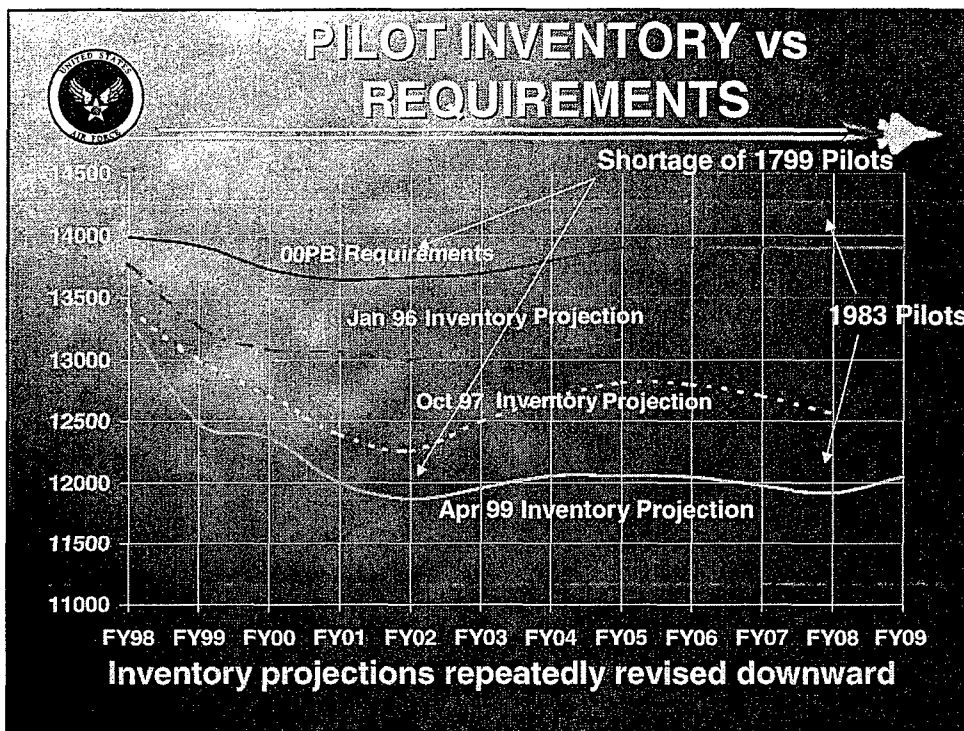
Forward Basing

4 times more
deployments

Robust
Infrastructure

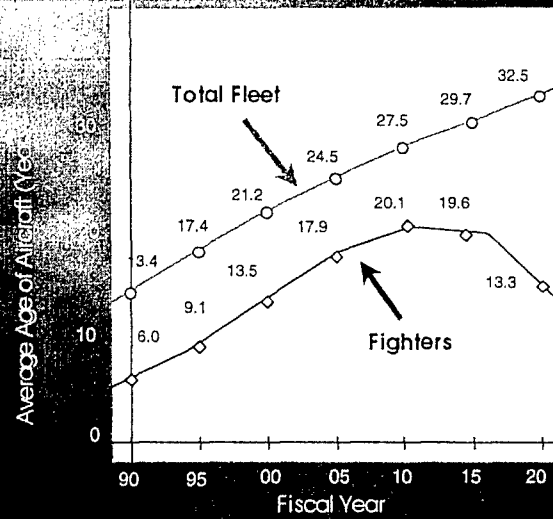
On Average 14,600 personnel
and over 220 Aircraft deployed







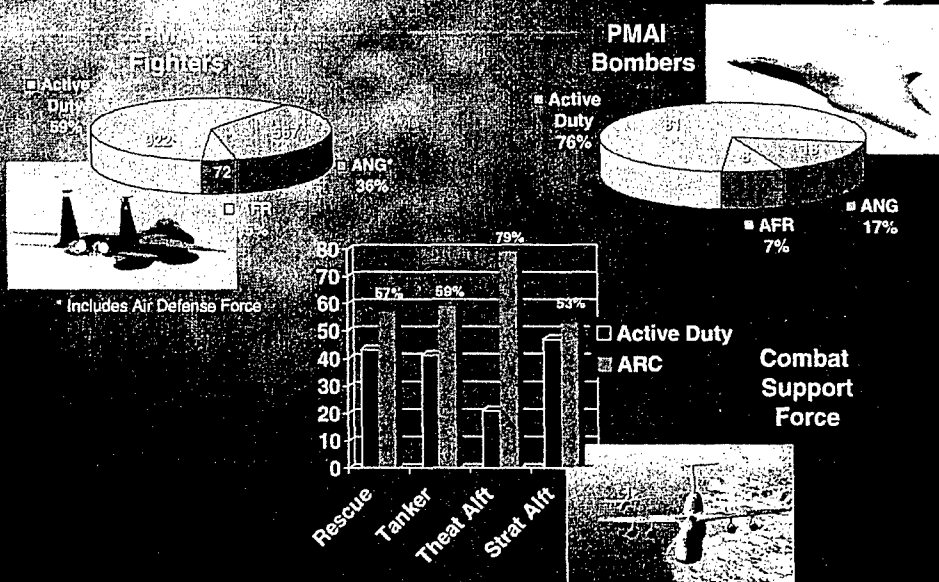
Aging Aircraft Fleet

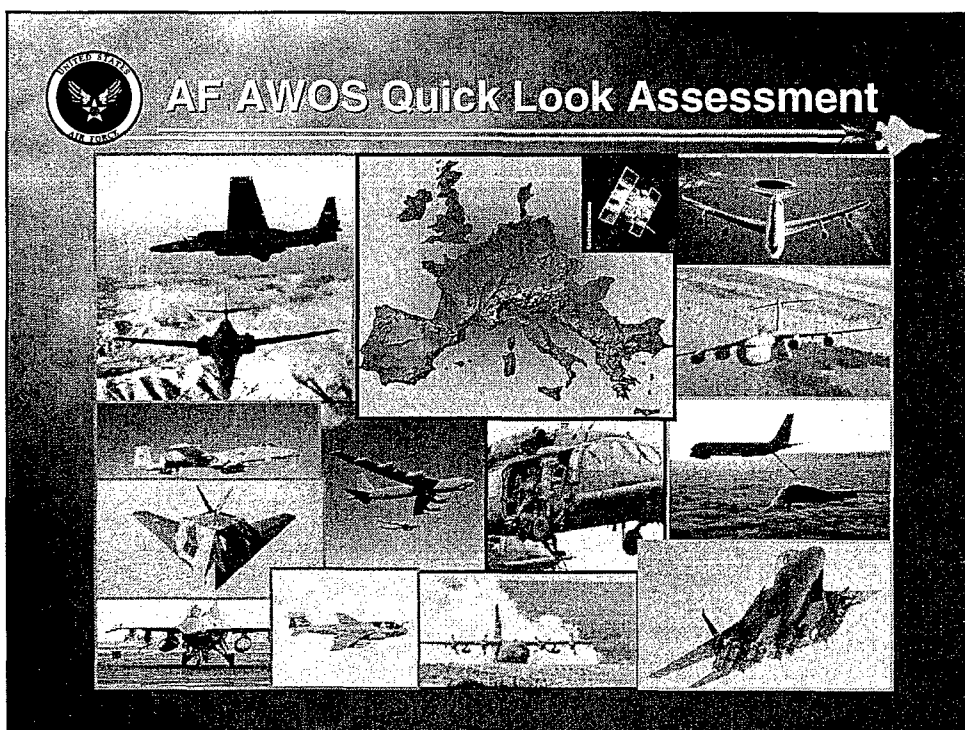


Over 75% of our aircraft are over 20 years old



Force Structure Migration







Air and Space Superiority

Fought/Won Control of the Air - Enabled Freedom to Maneuver

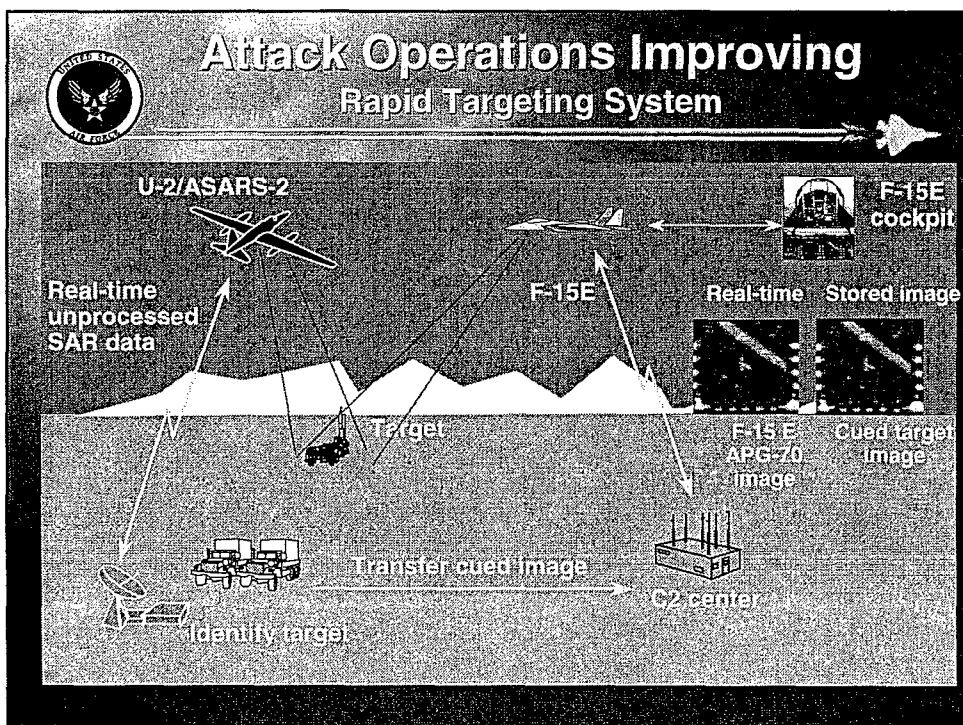
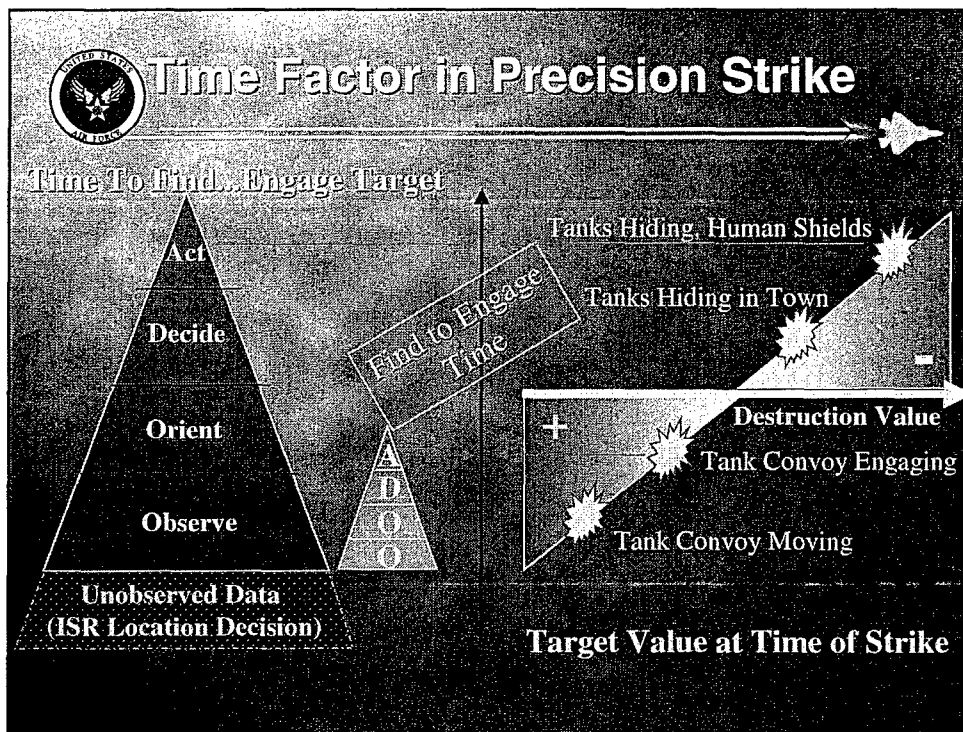
- No Successful Enemy Air to Ground
- 4900+ PGM Strikes
- 730+ SAM Shots
- 0 Aircrew Losses
- No Space Denial or Space Attack
- Prolonged Destruction of IADS Due to Enemy Tactics, Complex Terrain, US System Technological Limits
 - Hunkered SAMs Engaged with Low Tech Workarounds
 - Kept MANPADs Ineffective by Employment Altitude
 - Suppressed IADS to Current Technological Limits
- Opportunity Cost...Prosecution Pace Limited by Packaging



Precision Engagement

1991-10% PGM Platforms...1999-90%

- Over 5700 PGMs Delivered in 4900+ Sorties
- Current Sensor-to-Shooter...Technological Limit in Hours, Days
 - Collection, Analysis, Dissemination...C2 to C5 to C3 Too Slow
 - RTIC...Successes but Not Wide-Spread, Limits Real Time Strikes
- Shortfalls in All Weather Precision Weaponry, Standoff Weaponry





Information Superiority

- Coherent I/O Plan Essential to Lead and Finish Fight
- OPSEC Problems... Info Demands Exceeded Secure Means
 - Distributed Ops, Allies, Reachback... Comm Requirements
- ISR Force Engaged Across Battlespace... Reachback Critical
- Some Success in Allied Information Attack
 - IW Execution Difficult... Stovepipes Complicate Execution/Effectiveness
- BDA, BDI, Combat Assessment Better... But Still Tough Problem



Global Attack

- 49 B2 Sorties, 29 Hours Each, Over 650 PGMs Delivered
- B2 Synthetic Aperture Radar, JDAM Combination: Superb
- Global Attack is Tanker Intensive... Forward Basing Preferred
- B1 Block D Mod Vital... ALE50 Decoy = Survivability/Flexibility
- CALCM Re-Targeting... Not Real-Time nor "User Friendly"
- Leveraged Space Technologies to Improve BDI, Wx, Info Transfer



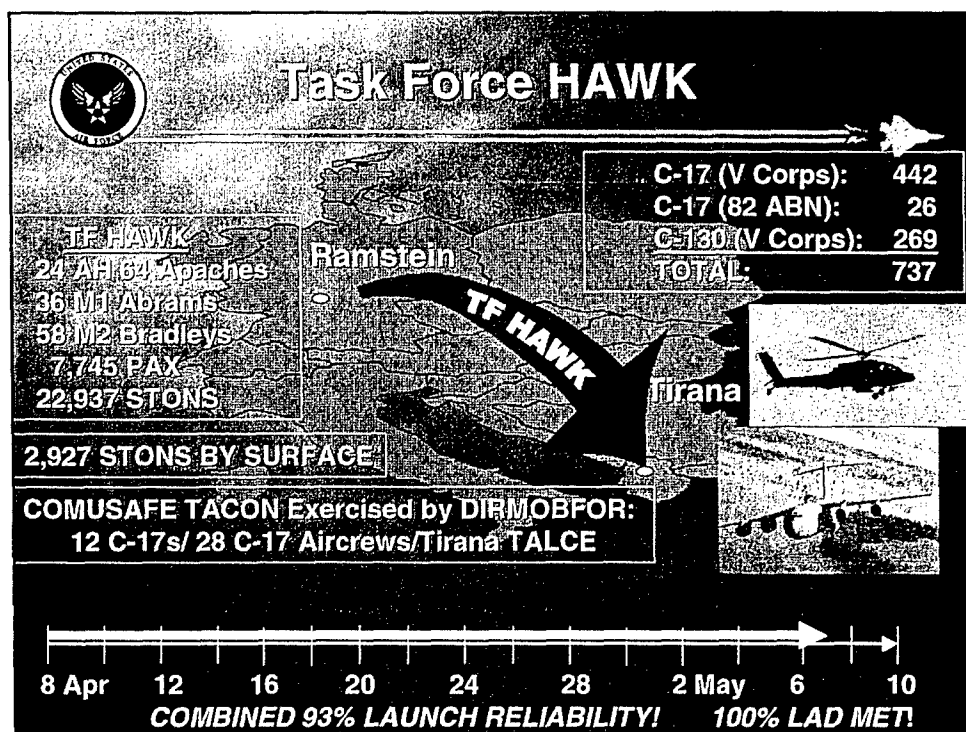
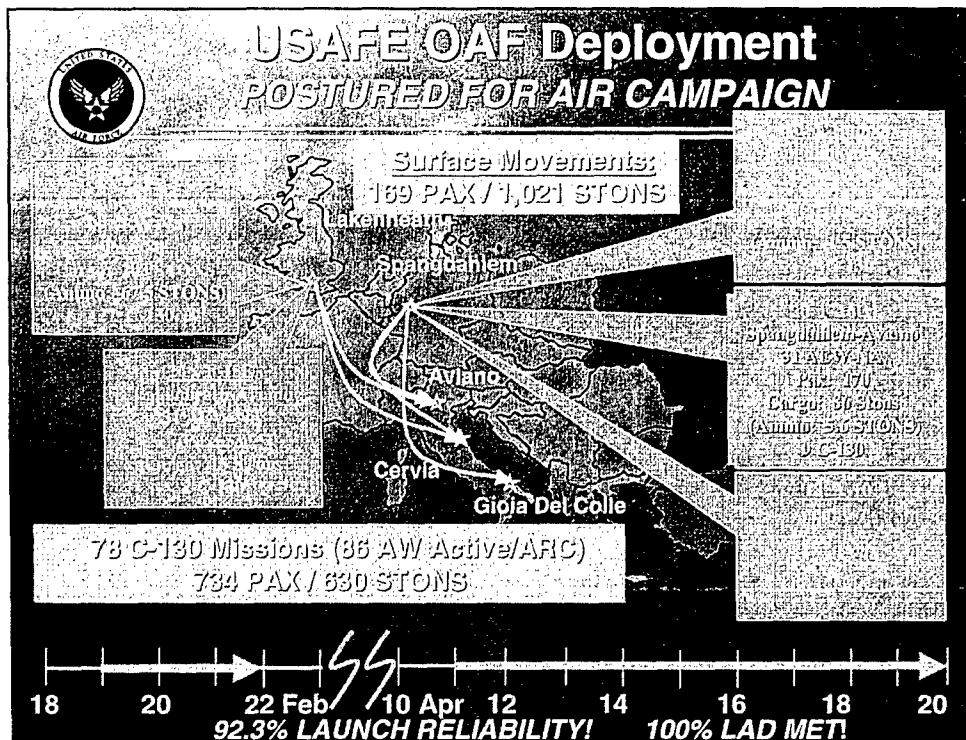
Agile Combat Support

- 37,000 Sorties... Less than 2% Maintenance Cancels
- STAMP Precision Weapons Essential... Airlift Opportunity Costs
- Overall Spare Part Shortage... USAFE and Depot Surge Aggravated By Low RSP Levels for Key Items
Brute Force Operations Made the Mission Work
- Combat Response Group First In Capability



Rapid Global Mobility

- C17 Five Star Performance
- C17 Flexibility Worth Investment (Shining Hope/Allied Force)
TAGON to Theater a Success Story (Situational Dependent)
- Threats Precluded Some Mobility Employment Options
Lack of Defensive Systems... Impact on AirLand, Air Drop
- Foreign Frequency Approval... Pacer Crag Acquisition/Employment
- CAOC Tanker Expert (0-6) Enhanced Tanker Utilization
- Eight Day Air Bridge Swing Increased Risk in 2nd MTW
- Tasked at 1.8 Crew Ratio... Manned at 1.36 / 1.27





Critical Caveats to Lessons Learned

Threats We Didn't See...

- TBM/Cruise Missiles
- Double Digit SAMS
- Sophisticated Air Employment
- Most Sophisticated MANPADs
- Space Denial, Attack
- Sea Threat... Mines, Subs, Blockade
- Terrorism in CONUS or Abroad
- WMD
- Organized Information Attacks
- GPS Jamming

← **Space Threat**

← **Sea Threat**

← **Land Threat**

← **Info Threat**



Nimble Lion

Modeling assisted combatant
commanders in Battlestaff Mission
Rehearsal

*Nimble
Lion*



Nimble Lion

- Prepared battlestuffs
- Commanders visualized their plan
- Planners reviewed big picture
- Significant lessons learned
 - TOTs
 - Orbit Locations
 - Timing
 - Attacks through Bosnia



Approaching the QDR: An Air Force Perspective

- Aerospace Force is Absolutely critical for defense strategy success
- It will be interesting
 - New administration
 - Changing threat
 - Budget
 - Modernization Bow Wave
- It has Already started
 - MRS-05
 - TRS-05
 - Dynamic Commitment
 - DPG Studies



Analytical Challenge:

- Models/Simulations/Analysis that accurately reflects reality
 - What force structure is relevant for the future
- Developing a cooperative/collaborative process



Questions



The Military in the 21st Century Information Age

A Perspective for the QDR

LtGen John E. Rhodes
CG, Marine Corps Combat
Development Command

Outline

- **The 21st Century Environment**
- **Implications to the Defense Establishment**
- **USMC Challenges**

The Environment in the 21st Century

INFORMATION ENVIRONMENT: TECHNOLOGY

- **Global, Ubiquitous Communications**
 - Perspectives, Biases, and Influence
- **Merging of Civilian and Military Networks**
- **Who drives / controls info-tech development?**
- **Relevance of traditional organizational and / or managerial principles?**

Technology is not a panacea, and may even add to chaos and unpredictability — adversaries will be able to obtain the same, or better, info technologies than those available to the military.

INFORMATION ENVIRONMENT: RISKS

- **Information addiction / dependence**
- **Technological blinders**
 - “Technophilia”
 - “Technophobia”
- **Shortened predictability cycle**
 - Obsolescence
 - False starts
 - Unexpected consequences

INFORMATION HUBRIS?

What has Info Superiority done for us lately?

- **Pearl Harbor**
- **PLA Invasion of Korea**
- **Vietnam**
- **USS Pueblo / USS Liberty**
- **Beirut**
- **DESERT STORM**
- **Somalia**
- **A-10 crash in the Rockies**
- **Saddam Hussein, bin Laden...**
- **India / Pakistan Nuclear Tests**

Implications to Defense Establishment

CHANGING ENVIRONMENT

- **Chaos in the Littorals**
- **“Lesser” threats**
- **Asymmetrics**
- **Decreasing Overseas Access**
- **Homeland Defense**

Defense Strategy

Shape, Respond, Prepare Now

Shape

Forward presence/engagement increases in importance. Dictates forces that are

- More adaptable
- More proactive
- Prepared for a wider spectrum of engagement

Defense Strategy

Shape, Respond, Prepare Now

Respond

To be most effective, forces must

- Reduce predictability
- Not rely on a rigid structure
- Be believable
- Be appropriate for threat

Forward presence leads to Speed of Response

Defense Strategy

Shape, Respond, Prepare Now

Prepare Now

Can't be constrained by traditional thought. Need to look toward

- Experimentation
- Overhauling acquisition system
- "Fixing" PPBS
- Improving training

and...

Defense Strategy

Shape, Respond, Prepare Now

Improving Analysis

- Non-linearity
 - Project Albert
- Mission Area Analyses
- New model developments

USMC Challenges

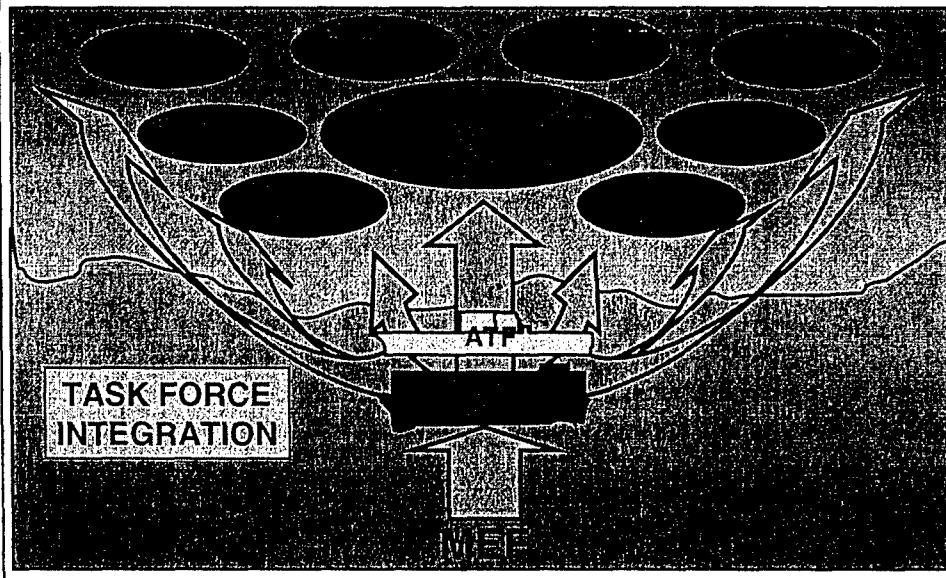
Employ the MAGTF as a Sea Based Operational Maneuver Element to...

- **Maximize inherent flexibility to mystify, mislead, and confuse**
- **Hit centers of gravity...Non-linear**
- **Enable decisive maneuver and engagement at time and place of JTF commander's choosing**
- **Protect the force**

MARINE CORPS C2 EXPECTATIONS

- “Full Range of Operations” Effectiveness
- Command and Coordination, vice Mechanistic Control
- Build Increased Tempo Through Key Elements of Commander’s Intent:
 - Intuitive Decision Making (Refined Decision Making Process)
 - Mutual Understanding (Common Educ. / Trng Experiences)
 - Implicit Communications
- Determine & Focus on Relevant Information
- Secure, Reliable Info Systems

OMFTS



IMPLEMENTATION APPROACH

- Full Spectrum of Expeditionary Operations
 - STOM: (Demonstration, Operations, Raid, Withdrawal)
 - Sustained Operations Ashore (SOA)
 - Other Expeditionary Operations (OEO)
 - MPF(F): (Linchpin to future Warfighting Capability)
- Transformation / Implementation Strategy
- Ongoing Efforts
 - MCCDC “(MC)²” Effort / Project Ellis / Project Albert
 - ELB / IMMACCS / RSTA

The Bottom line.... Marines Will :

Have one foot firmly planted in the past

and be constantly leaning forward, with

One foot firmly aimed toward the future



NDU QDR '01 Working Group

Getting It Right: Process and Analytic Challenges for the Next QDR

**Ms. Michele Flournoy
Institute for National Strategic Studies
National Defense University**



NDU QDR '01 Working Group

Purpose

- **Identify significant process and analytic challenges for QDR 2001**
- **Suggest ways in which MORS can help meet these challenges**



NDU QDR '01 Working Group

Process Challenges: The Big Four

- **Compressed timeline**
- **Putting strategy in the driver's seat**
- **Integration**
- **Unknowable process design**



NDU QDR '01 Working Group

Meeting the Process Challenges: How OR Can Help

- **Advance preparation**
- **More flexible, responsive analytic tools**
- **Analytic roadmaps**
- **Better use of decision support tools**



NDU QDR '01 Working Group

Advance Preparation

- **Develop suite of methods and tools**
 - For full range of analytic tasks
- **Conduct rigorous baseline analysis**
 - In all anticipated issue areas
 - Test/refine analytic methods and tools
 - Develop candidate issues and options based on results
- **Anticipate range of possible guidance and develop associated analytic requirements**



NDU QDR '01 Working Group

More Agile and Responsive Tools

- **Better scoping tools**
 - Explore broader range of variables/options
 - Identify areas that merit further analysis
- **“Quick turnaround” tools**
 - Enable multiple runs within QDR timeline
 - To investigate more variables and options, build confidence in results
 - Support ongoing dialogue between decision-makers and analysts
 - To respond to new/evolving policy guidance



NDU QDR '01 Working Group

Analytic Roadmaps

- Identify major issue areas and potential desired outcomes in each area
- Create draft analytic roadmap for each area
 - Flow chart showing end-to-end analytic process -- how issues/options will be framed, analyzed and brought to decision
- Develop cross-cutting analytic plan that identifies how analysis in one area will inform others and vice versa
- Anticipate gaps/shortfalls and develop workarounds before review begins



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Better Use of Decision Support Tools

- Tools to organize complex decisions
 - Identify key elements of decision
 - Highlight relationships between different issues
 - Collate and match disparate analyses across organizational lines
- Tools to track the QDR's progress
 - Manage complex process with many moving parts
 - Ensure policy implementation and accountability
- Display tools
- Tools to facilitate integration and final decision-making



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Analytic Challenges: The Big Four

- **Full spectrum analysis**
- **Capturing how we actually fight -- now and in the future**
- **Analyzing TEMPO and force management issues**
- **Supporting DoD transformation**



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Full Spectrum Analysis

- **Analyzing full range of what strategy may require**
 - **Shaping**
 - **Peacetime engagement**
 - **Overseas presence**
 - **Responding**
 - **Smaller-scale contingencies (SSCs)**
 - **Major Theater Wars (MTWs)**
 - **Countering WMD, IO and other asymmetric threats**
 - **Homeland defense**
 - **Preparing**
 - **New operational concepts and organizational arrangements for transformation**



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Capturing How We Actually Fight - Now and in the Future

- Attrition-based models vs. effects-based focus
- Show effects of evolving capabilities
 - e.g. C4ISR, strategic interdiction, dominant maneuver
- Assume adversaries will use asymmetric approaches
 - WMD, IO, terrorism and others
- Play actual and emerging operational concepts
- Assume US forces will transition from a posture of engagement
- Play allied/coalition capabilities more realistically
- Incorporate broader scenario set
 - e.g. delayed/denied access, urban terrain



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Analyzing TEMPO and Force Management Issues

- Need to understand what our forces are doing/how they are spending their days away from home
 - Historical TEMPO data not readily available
 - Data spotty and often poor quality
- New TEMPO analysis tools required
 - Analyze combined demands of:
 - Full range of SSCs
 - Peacetime engagement
 - Away from home training
 - Cover all personnel (including all CS/CSS)
 - Assess impacts of TEMPO on readiness

Goal: Be able to analyze TEMPO and its impacts by type unit, type weapon system, or type personnel as appropriate



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Supporting DoD's Transformation

Need new analytic tools for assessing:

- New technologies and capabilities
- New operational concepts
- New organizational arrangements
- Alternative investment approaches to S&T, R&D, and procurement
- Alternative approaches to streamlining DoD's infrastructure and improving its business practices



NDU QDR '01 Working Group

Conclusion

- OR can make an enormous contribution to quality of QDR analysis, process and decisions
- Next 11 months are critical for addressing important process and analytic shortfalls

A concluding challenge and call to action:

Develop an analytic gameplan for QDR 2001 that the next SECDEF will find too good to refuse



NDU QDR '01 Working Group

Back-up Slides



NDU QDR '01 Working Group

NDU QDR Working Group Objectives

- **Phase I (Oct 98-Apr 99): Identify key issues for next QDR to jump start Joint Staff and OSD analytic preparation**
- **Phase II (Sept 99-Nov 00): Provide Joint Staff and Services with insights, analysis, and recommendations on:**
 - Defense strategy alternatives
 - Criteria for sizing U.S. conventional forces
 - Strategy-based force structure alternatives for 2005-2010



NDU QDR '01 Working Group

Top 10 Desired Outcomes

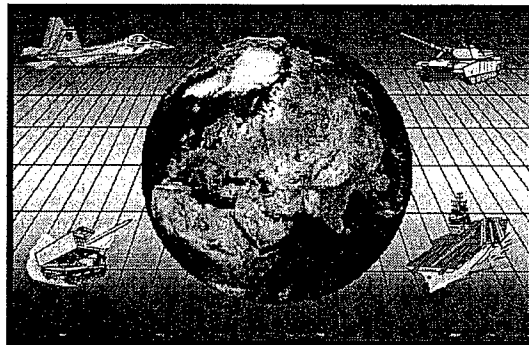
Goal: A balanced, sustainable defense program that executes strategy with acceptable risk

- Refined strategy, including force sizing criteria
- Reduced peacetime PERSTEMPO strains
- Clear, concrete transformation strategy
- Investment strategy that reflects transformation strategy
- Interim vision for reengineering the Total Force
- Consensus on DoD requirements of Homeland Defense
- Strategy for maintaining nuclear deterrence and strategic stability as U.S. deploys limited NMD
- U.S. overseas posture that better positions U.S. for future challenges
- Streamlined infrastructure
- Better business practices

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DYNAMIC COMMITMENT Wargame Series

Beyond



2000

Overview Briefing

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DYNAMIC COMMITMENT SERIES

What models will be used in the QDR?

DYNAMIC COMMITMENT is one model.

DYNAMIC COMMITMENT provides an alternative approach in that it looks beyond "warfighting," and the capabilities required to be successful.

Rather, the series looks in detail at the availability of those capabilities and illuminates the effects of performing SSCs on U.S. Forces.

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DYNAMIC COMMITMENT SERIES

Today's Briefing:

- **Background and Objectives**
- **Mechanics of Playing the Wargame**
- **Development Efforts**

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DYNAMIC COMMITMENT SERIES

**The
Cold War
Ends**



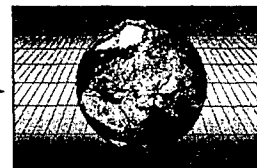
**SSC Response
Requirements Increase**

**DYNAMIC
COMMITMENT 97
Wargame Series**



**Is the projected POM Force suitable to
execute the current strategy or a
near-term alternative strategy?**

**DYNAMIC
COMMITMENT
Beyond 2000
Wargame Series**



***A STRATEGIC-LEVEL, FORCE ALLOCATION WARGAME SERIES
THAT BRINGS THE RIGHT PEOPLE TOGETHER TO ASSESS THE
FORCE***

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DYNAMIC COMMITMENT 1997 Series

DYNAMIC
COMMITMENT 97
Wargame Series



Services and QDR panels used DC 97 to shape their respective QDR inputs

- **Provided quantitative data to analyze:**
 - Forward presence challenges
 - OPSTEMPO/PERSTEMPO stresses
 - LD/HD shortfalls
- **Provided forum for participants to develop qualitative risk assessments**
- **Showed why the POM Force was suitable, though stressed, to execute military response requirements**
- **Reported the current force structure as fragile and stressed - emphasized that any reductions, especially in uniquely-configured platforms or units must be considered carefully**

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DYNAMIC COMMITMENT B2K The Legislation

ISSUES FOR INVESTIGATION:

1. Discussion of strategy and force structure best suited to implement strategy at low-to-moderate level of risk
2. Assumed or defined national security interests of the United States
3. Threats and scenarios used in the review
4. Assumptions
5. Effect of OOTW and SSCs on force structure readiness for high-intensity combat
6. Manpower & sustainment policies needed to support > 120 day conflicts
7. Roles & missions of reserves/strength, capabilities, & equipment required
8. Tooth to tail ratio
9. Airlift, Sealift and ground transportation capabilities required
10. Anticipated requirement for forward presence, PREPO, & deployed force
11. Extent to which resources must be shifted between theaters
12. Advisability of revisions to UCP as a result of national defense strategy
13. Effect of anticipated technology advancements on force structure
14. Any other matter the Secretary considers appropriate

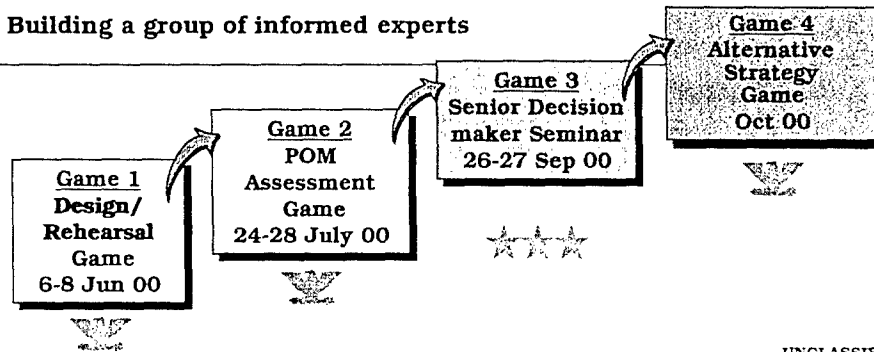
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DYNAMIC COMMITMENT B2K Objectives

A STRATEGIC-LEVEL, FORCE ALLOCATION WARGAME SERIES,
IN SUPPORT OF THE QDR, WITH FOUR MAJOR OBJECTIVES:

- Identify the suitability of Projected US Forces (POM Force) to meet future challenges
- Identify key risks associated with the future employment of force
- Building a baseline database for the QDR Process
- Building a group of informed experts



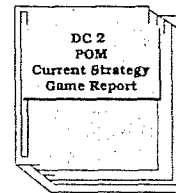
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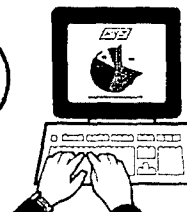
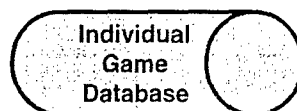
DYNAMIC COMMITMENT B2K Outputs

Game report of insights gained

- JS, CINCs, Services, Agencies
all contribute inputs



Game database for follow-on analysis



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Mechanics of Playing the Wargame

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DYNAMIC COMMITMENT Team Structure

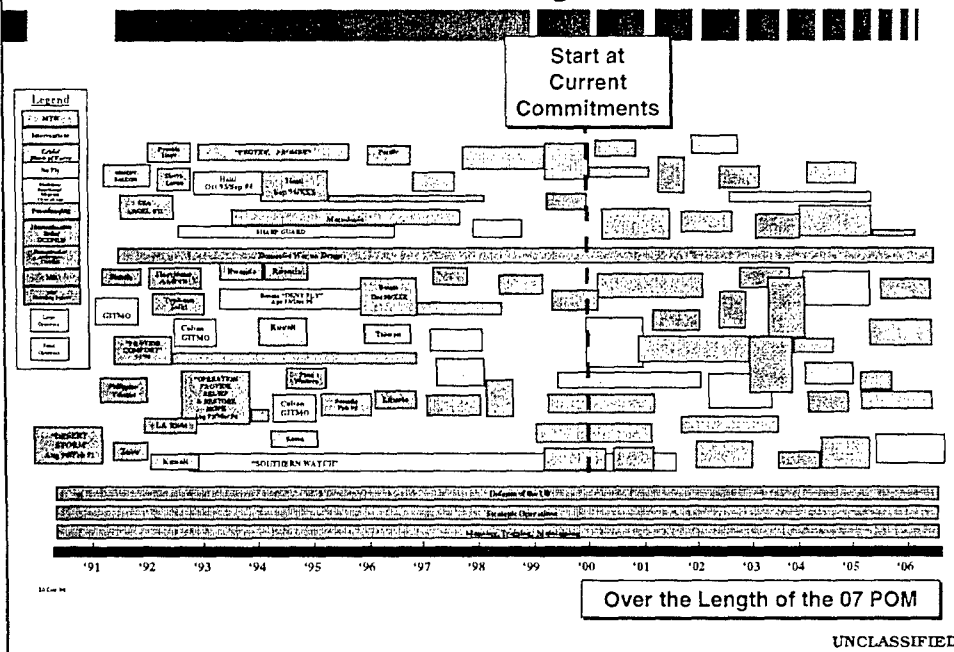


**Participants from JS, OSD, Services, CINCs, USCG,
DOD Agencies, and Coalition (UK & Australia)**

- **Player team of Combatant CINCs, Services,
and Coalition**
- **Support teams**
 - **Risk assessment team**
 - **Support team (Lift, Log, C4ISR, Personnel)**
 - **Resources team (STRATCOM, NORAD, SOCOM)**
 - **Oversight/NCA team**

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DYNAMIC COMMITMENT B2K
Illustrative Vision of the Future




DYNAMIC COMMITMENT B2K

SSC Vignettes

- **Illustrate full spectrum of US Military commitments over recent history, as well as capabilities addressed in strategy, short of MTW**
- **Hypothetical locations balanced across all regional CINC AORs**
- **Incorporate allied/coalition support, where likely**

Opposed Intervention
 • **Include CONOPs/POPs Lists:**
 Humanitarian Intervention
 Peace Accords/Agreements
 Follow-on Operations/DPG Support Services
 Interpositional Peacekeeping
 Domestic Disasters Relief
 OSD/JS/ENCs/S
 Foreign Humanitarian Assistance

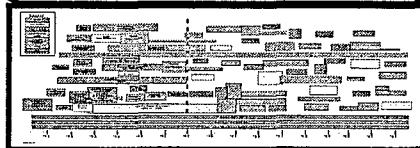


No-Fly Zone
 Maritime Intercept Operations
 Support to Domestic Authorities
 NEO
 Show of Force
 Strike

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DYNAMIC COMMITMENT B2K "Building the Future"

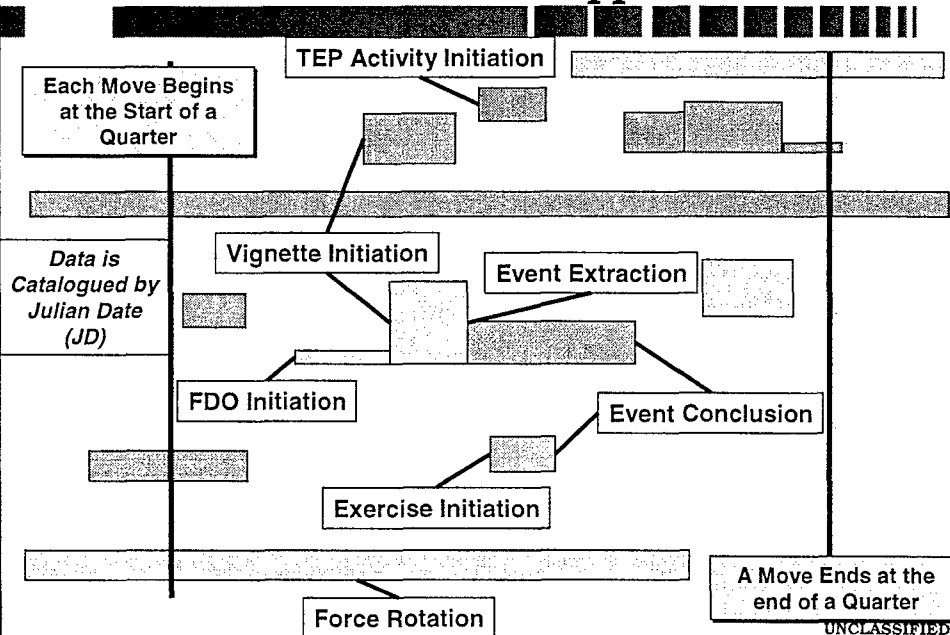
- Event loading, by year, derived from historical experience and Defense Planning Guidance
- Ongoing real-world events continue
- Specific event laydown randomly generated from library of 63 vignettes
- 2MTWs positioned as desired to test impacts



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DYNAMIC COMMITMENT B2K DC is an Event Stepped Game



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Development Efforts

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DYNAMIC COMMITMENT B2K

Study, Analysis & Gaming Div (SAGD) Goals

- To significantly enhance the DC gaming process
- To allow the Services and other participating organizations a long lead time to develop analytic tools capable of supporting the DC gaming process and to analyze resulting data
- To enhance our ability to explore an alternative strategy, and/or force structure

Required an early start to the DCB2K development process in order to develop new vignettes and improve the game process

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DYNAMIC COMMITMENT B2K

Workshop I

Workshop I: O-5/6 Level (Principal + One)

Purpose: DC "Development Kick-Off"

Objectives:

- To develop a common understanding, among participants, of the DC series broad objectives
- To discuss desired areas of analysis for QDR Next
- To discuss data output for DC
- To develop common understanding of the way ahead

2-3 June 99 @ BAH, McLean, VA

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DYNAMIC COMMITMENT B2K

Vignette Concepts

- All game participants nominated ideas
- Resulted in 167 proposed vignettes
- Vignette working group reduced to 99
- Working group evaluated concepts based on criteria they developed
 - Plausibility
 - Supports NSS and Defense Guidance
 - Appropriateness of utilizing a military response
 - Degree to which scenario facilitates response options
 - Uniqueness
 - Complexity

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DYNAMIC COMMITMENT B2K Workplan Management

- **J-8/SAGD established vignette development workplan based on following criteria:**
 - Workgroup Evaluation
 - DPG Requirements
 - Game Balance Requirements
 - DC97 Vignette Availability
 - Coalition Input
- **J-8 leadership approved vignette development workplan**

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DYNAMIC COMMITMENT B2K Vignette Development Status

Final Vision:

- **A library of ~63 vignettes that will be used to run all DC games required by the QDR process**

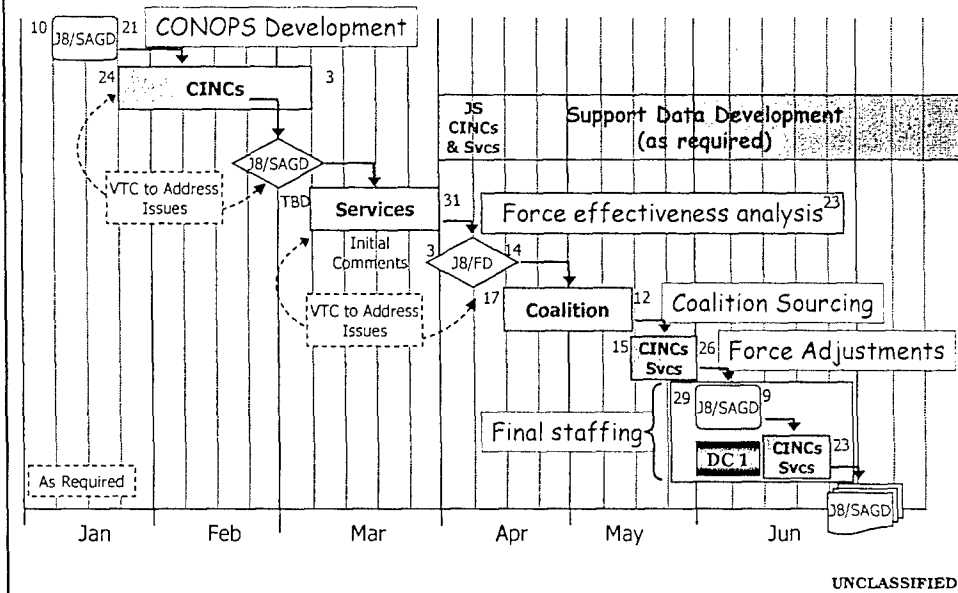
Way Ahead:

- ✓ **Threat Review (DIA)**
- **CONOPs and required force capabilities (CINCs)**
 - **Force review and effectiveness analysis (Services)**
 - **Coalition contribution (UK, Australia)**
 - **Support data, as required (CINCs, Services, and JS)**

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DYNAMIC COMMITMENT B2K Vignette Development Timeline



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DYNAMIC COMMITMENT B2K Improvements Envisioned

Increase capability to examine the POM force and any near-term alternative strategy and/or force structure proposed:

- **Coalition** - Inclusion of Australia & UK
- **Metrics** - Defined Measures of Effectiveness (MOEs)
- **Readiness** - Increased ability to measure readiness impacts
- **Warfighting Analysis** - Services pre-game force effectiveness analysis of selected vignettes
- **Automate Game Management** - Increased real-time analysis during games, creation of a game results database, real-time visualization of status

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DYNAMIC COMMITMENT B2K Including Coalition Participants

- UK and Australia have agreed to participate
 - CINC will determine appropriate level of force during game
- Unlikely that UK-AUS database will be interoperable
 - May require White Team manual interface

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DYNAMIC COMMITMENT B2K Workshop II

Workshop II: O-5/6 Level (Principal + One)

Purpose: DC “Metrics Development”

Objectives:

- To continue the development process started in Workshop I.
- Brainstorm metrics and measures of effectiveness that can be used to examine the POM force and any near-term alternative strategy and/or force structure proposed

27-28 October 99 @ BAH, McLean, VA

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DYNAMIC COMMITMENT B2K Metrics Development

- **Metrics refined into five categories**
 - Force availability/size and overall mix
 - Availability of special resources
 - Strategic mobility
 - Adherence to OPTEMPO Rules
 - Capability mismatches

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DYNAMIC COMMITMENT B2K Readiness Analysis

- **Exploring the use of existing measures during DC game**
 - JMRR
 - GSORTS
- **JS J38, CINCs, Services involved in the process**
- **Exploring (via SORTS) the historical effect of ops on readiness**

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DYNAMIC COMMITMENT B2K Effectiveness Analysis

- **Recommending Services analyze vignettes in the following categories using existing combat modeling tools.**
 - **Opposed Interventions (3)**
 - **Non-permissive NEOs (7)**
 - **Strikes (4)**

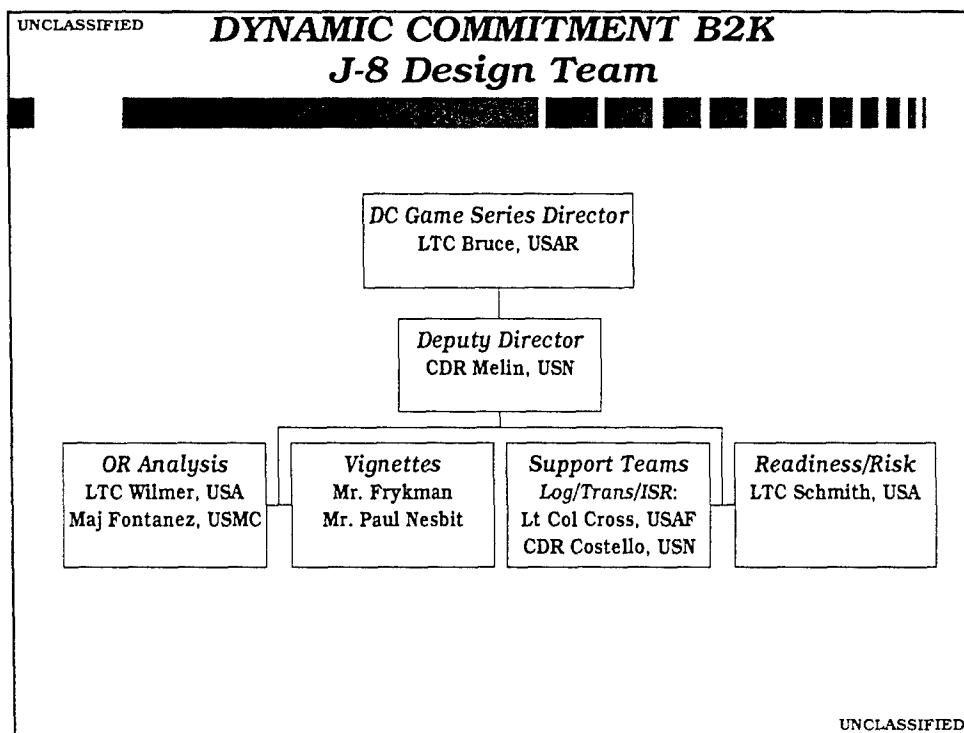
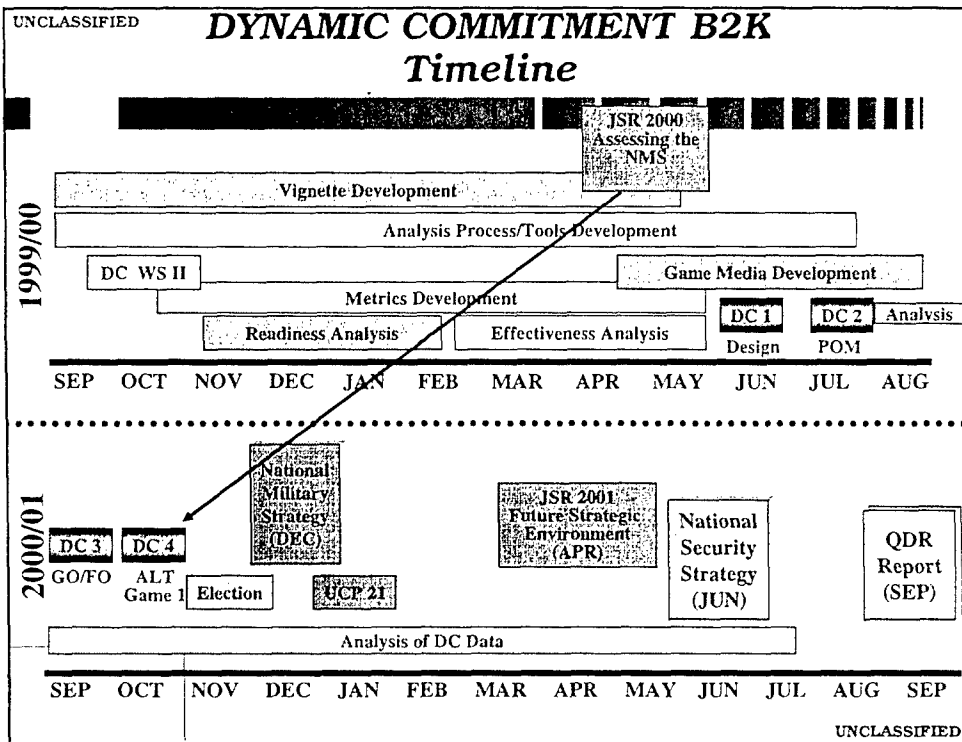
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DYNAMIC COMMITMENT B2K Analysis Process and Tools

- **During the Game**
 - **Provide an automated environment to manage info**
 - **Provide improved links between teams**
 - **Provide visualization of game status**
- **Post Game**
 - **Game report with participant perspectives**
 - **A database for each game series**
 - **Archive DCB2K game database for each series**
 - **All participants and QDR panels access to database**

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Integration Working Group

Chair – Dr. Robin Buckelew

Co-Chair – Dr. Paul Davis

3 February 2000



Integration Working Group

Participants

Dr. Robin Buckelew - Chair
Dr. Paul Davis - Co-Chair
Leroy Abner - USASOC
Dennis Coulter- ABTECH
Chan Crangle - USMC
Doug Matty - USMA
Patricia Cook - AMSAA
Vicki Huo - CAS
Judith Bundy - CAA
Roy Rice - TBE
Bob Might - IMC
LTC George Stone - CLW
Scott Conrad - OSD/PA&E
Patricia Hutzler - LMI

COL Greg Parlier - USAREC
Kevin Saeger - OSD(OD)
Jim Prouty - Dynetics
Eileen Doherty - SY Tech
Marilyn Macklin - HQDA
Col Bruce Wong - USAF
Royce Kneece - OSD/PA&E
Peter Sharfman - MITRE
Louis Moore - RAND
COL Bruce Palmatier - Army/PA&E
Chris Wertman - BAH
Richard Hillestad - RAND
Dave Waters - SY TECH
Louis Bryant - SAIC

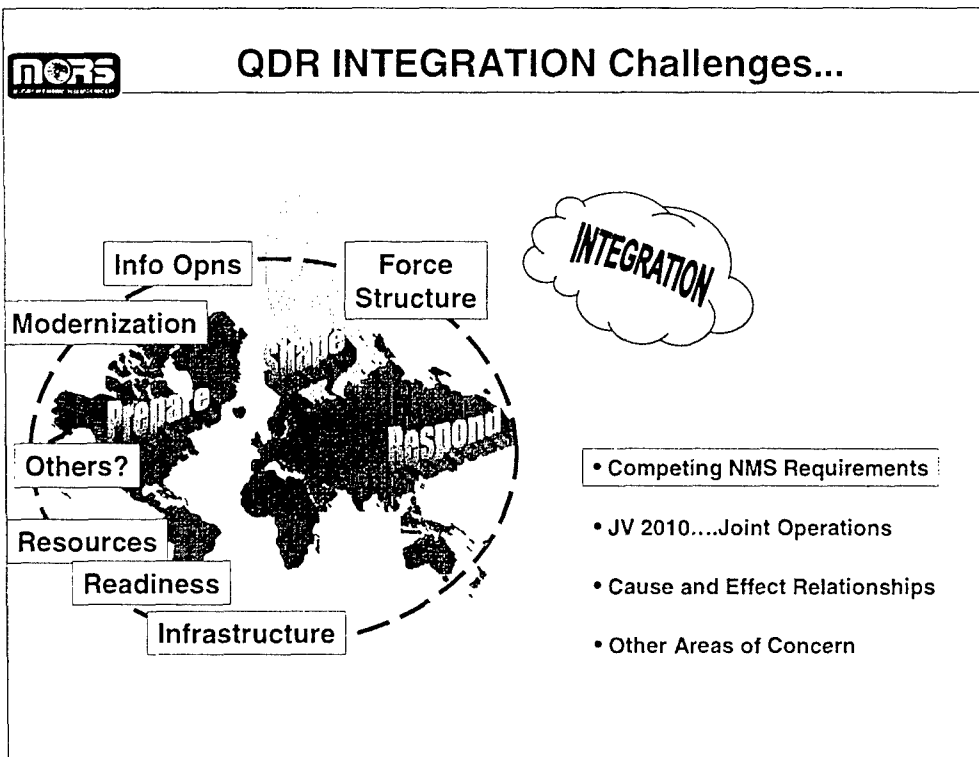
Key participants in the Integration Working Group are listed here.



Integration Working Group Purpose

- Gain an understanding of Services and Joint Staff QDR integration challenges.
- Identify and assess analytical models and processes Designed to provide insights to QDR integration challenges.
- Provide recommendations for how best to leverage models and processes presented.

The Integration Working Group purpose is shown here.



QDR challenges facing the operations research community are vast. None may be as important as developing tools and processes that serve to integrate and synchronize OSD, the Joint Staff and Service efforts to get at one common issue — how best to leverage and integrate all Service capabilities to maximize performance in executing the National Military Strategy (NMS).

The Integration Working Group focused on identifying ways and means to address challenges to QDR integration across three basic azimuths:

1. Analytic support for those challenges pertaining to competing NMS requirements.
2. Integrating Service and Joint Staff efforts.
3. Looking at ways to address trade-offs and cause and effect relationships.



Integration Challenges

Services

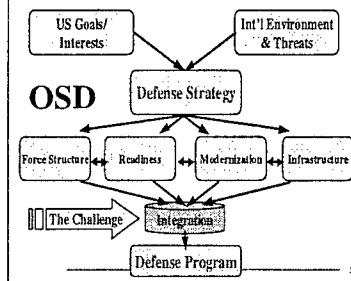
- Nontransparency
- Little Collaboration
- Little Coordination
- Service Parochialism
- Little if any common use of M&S
- Strategy vs Budget Driven
- Risk .. Define and quantify
- Data..weak or none
- Service Trade-offs
- Investment Trade-offs
- JS QDR Organization

Joint Staff

- Little Collaboration
- Limited Available M&S
- QDR Organization
- CINC Participation
- CINC Engagement Plans
- Dynamic Commitment

Primary QDR Concerns

Integration Analysis Challenge: Making Sense Out of Apples and Oranges



Services, Joint Staff and OSD participants identified a myriad of challenges relating to QDR integration. Shown here are the primary QDR concerns and issues raised.

Many of the concerns identified were primary concerns to all participants. Issues such as Service collaboration and coordination, a strategy versus a budget driven QDR process, and Service/investment trade-offs were clearly the front runners for discussion.



Service Integration Challenges

Services

- Nontransparency
- Little Collaboration
- Little Coordination
- Service Parochialism
- Little if any common use of M&S
- Strategy vs Budget Driven
- Risk .. Define and quantify
- Data..weak or none
- Service Trade-offs
- Investment Trade-offs
- JS QDR Organization

May Lead to:

- Little communication between Services
- Tendency to question all aspects of a Service's position
- Distrust between Services

From the perspective of the four Services, key integration issues focused primarily on still lingering concerns from QDR '97 of inadequate communication and collaboration among Services and the lack of timely access to information being used by others for decision making. The Services also voiced their concerns for the common use and reuse of Models and Simulations (M&S).

The Services were also concerned that possible required trade-offs between Services coupled with little communication may foster parochialism and nontransparency.



Joint Staff Integration Challenges

Joint Staff

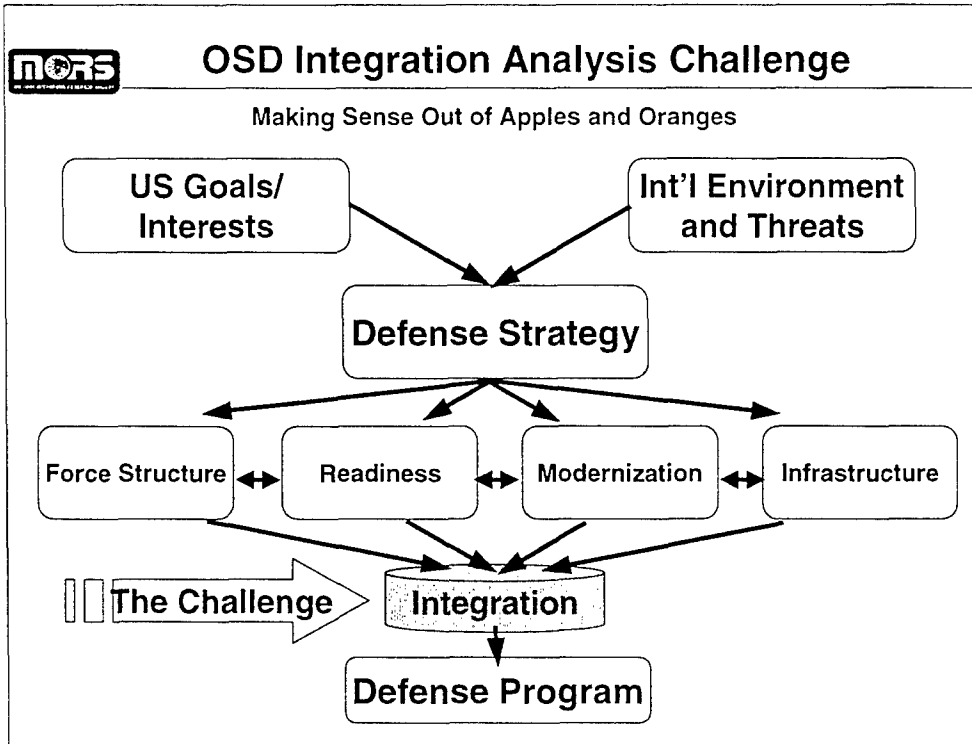
- Little Collaboration
- Limited Available M&S
- QDR Organization
- CINC Participation
- CINC Engagement Plans
- Dynamic Commitment (DC)

May Lead to:

- Perception of little collaboration with Services
- Limited CINC involvement
- Sense of inadequacy in addressing theater engagement requirements

Discussion within the working group indicated that during QDR '97 the Joint Staff was perceived as being isolated. Services perceived little collaboration with the Joint Staff...and Joint Staff perceived little cooperation with the Services.

Dynamic Commitment (DC), while being a key event for addressing concerns associated with the force allocation to execute the NMS, was seen as not robust enough to address theater engagement needs or force sufficiency concepts.



The working group discussed a number of organizational issues that will affect QDR 2001. A core issue relates to how QDR 2001 will be “approached.” Will it be seen as fundamentally a budget drill with winners, losers, and a zero-sum game; will it be seen as focused on relating objectives, strategies, and needs, but with an understanding that Services will be able to use savings accomplished to pay for their other priorities; or will there be a combination in which the more painful cross-service tradeoffs are accomplished in a first phase?

As a practical matter, the ability to analyze, cooperate and integrate cooperatively will depend on the approach taken because it will determine the attitudes of participants.



QDR Organization

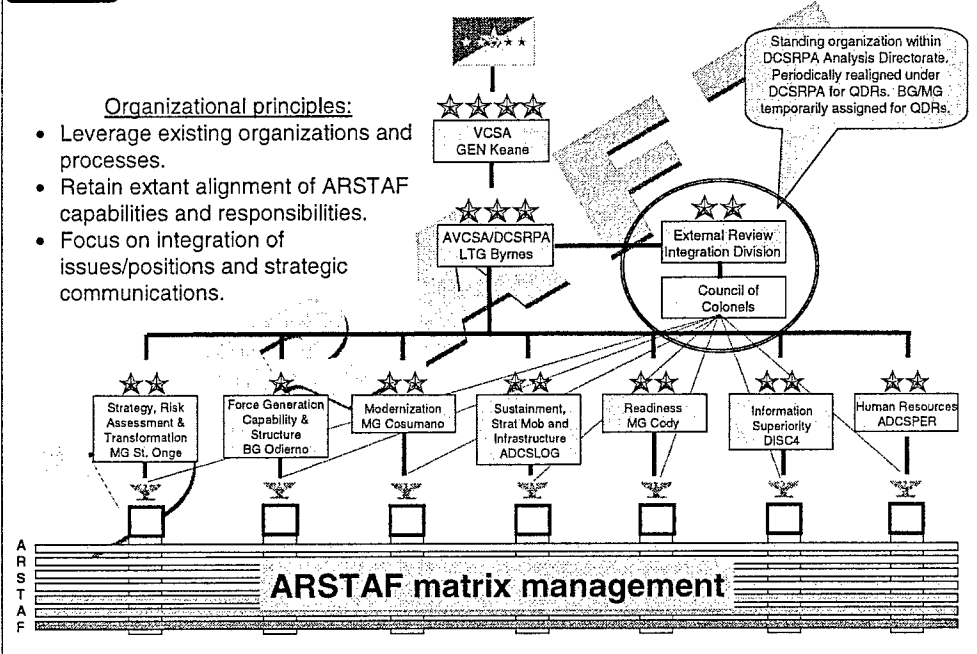
Services and Joint Staff QDR organizations are designed to:

- Integrate QDR activities throughout organization.
- Help facilitate collaboration and cooperation between one another and Congress.
- Assist in focusing DoD QDR effort toward same end state.

Many of the QDR integration challenges posed thus far can be mitigated with coherent and synchronized Service and Joint Staff QDR organizations.

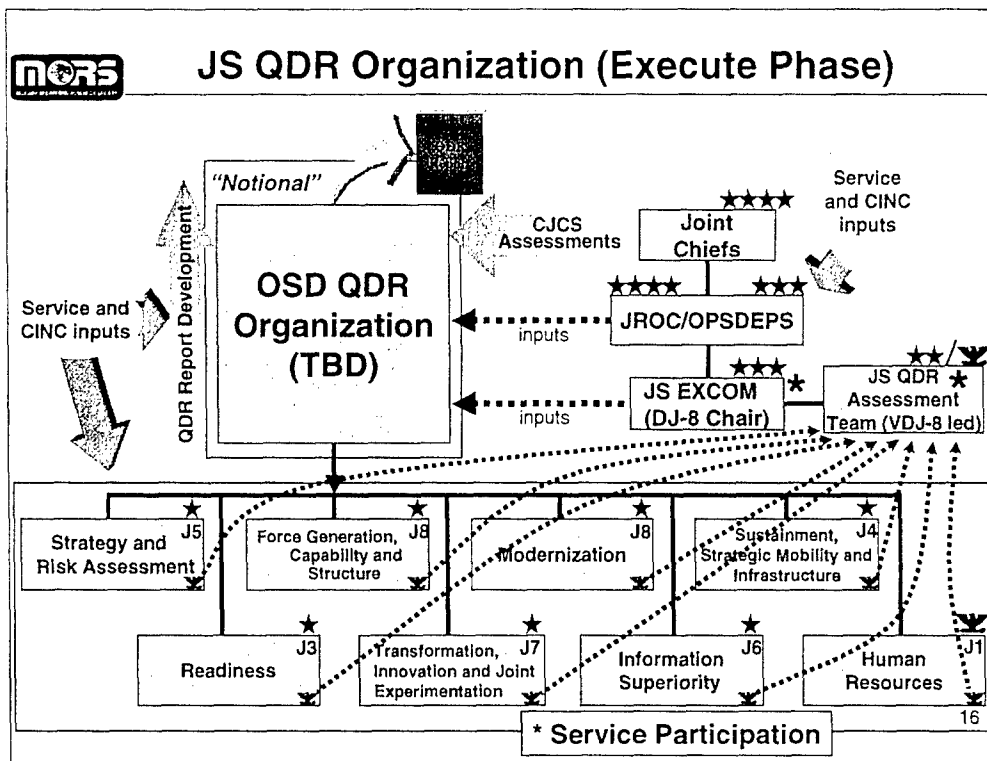
These organizations can facilitate collaboration between players, serve as a conduit between respective organizations and Congress, and help minimize process-related difficulties ranging from not understanding each others inputs to providing a mechanism to formally address disagreements.

Proposed Army QDR Organization



Though the Army's QDR organization has not yet been approved, it appears as if the organization will be very similar to the organization depicted here.

Key to the Army QDR organization scheme is the External Review Integration Division (ERID) that is designed to ensure integration and collaboration across the Army Staff (ARSTAF).



The Joint Staff QDR organization is shown here. Note that the Joint Staff looks for Service participation at the QDR panel level (1 Star)...as opposed to Service concerns that their participation also be at the JS QDR Assessment level (2 Star).



Methods to Deal with Risk and Uncertainty

- Fast-running mission-task-level models, with higher level integration that involves optimized" tradeoffs across thousands of vignettes.
- Exploratory analysis.
- Portfolio methods.
- New "inventory" models to track resources and reserves in diverse sequences of SSCs, NEOs, presence missions, MTWs, etc.
- MTOF-like processes — if extended and iterated — to create basis for assumptions about resources needed for tasks.
- "Firm-Handshake" gaming methods.

No one emphasized (or hardly mentioned) use of big models

As emphasized by first-day speakers, there is considerable interest in explicit discussion of risk. The analytic community now has a variety of related methods. Robert Might discussed a tool for integrating work done at the mission/task level. That tool does optimal allocation of resources as capabilities are assessed for thousands of higher level, vignettes. Lou Finch also emphasized the importance of such allocation methods, noting that, without them, analysis can be driven by low-level subjective human decisions that confuse issues.

Exploratory analysis can help us understand risk and uncertainty. It can also help identify strategies that are flexible, adaptive and robust — strategies that also control risk and leave open the potential to exploit better-than-expected developments. The DynaRank portfolio-analysis tool for decision support was discussed, and noted that it or earlier variants have been successfully applied to a variety of policy problems.

The feasibility and value of an "inventory-like" model to track resources and reserves in diverse sequences of SSCs, NEOs, MTWs, etc was also discussed. This would be a valuable addition to the human-intensive Dynamic Commitment (DC) games.

Several speakers discussed the Army's development of MTOF knowledge bases, which provide reasoned estimates of what is necessary militarily to accomplish a wide range of tasks. A joint version of this would be quite valuable. Given such knowledge bases, gaming methods such as "Firm Handshake" become possible and powerful.



Analytic Tools and Processes

These are current DoD and COTS tools and processes that combine SME features with quantitative processes and models that can provide insights into risk and uncertainty!

Firm Handshake Wargame Simulation

Full Spectrum Analysis Tool

Army's MTOF Process

Dynamic Commitment

Exploratory Analysis

DynaRank

FA&CT

JRAM

ACT

When combined with traditional attrition-based M&S...these tools may provide a means to integrate requirements across the full spectrum of conflict !

A primary thrust of the working group was to identify analytic tools and processes that may be appropriate for use during the upcoming QDR. The first point is probably that technology has improved a good deal in the last few years. As a result, there now exist tools that could help the QDR 2001 process materially.

These tools and processes, when used in conjunction with traditional M&S, can provide a means to assess and gain insights to virtually all types of operational requirements across the spectrum of conflict.



Recommendations

- Understand QDR may be about Strategy but will be in a resource "informed" environment:
 - reduces Service parochialism.
 - increases Service collaboration and coordination.
- Make M&S utilization within Services transparent and encourage cross-Service usage of M&S.
- Update/complete data in Joint Data System to include required data for SSC analysis and Theater Engagement priorities.
- Develop common Service MOEs to the degree feasible for all missions across the spectrum of conflict.
- Focus on maximizing integrated Service capabilities required to execute the NMS..ala a joint task organized force construct..Services complement vice compete with each other.



Recommendations

- Encourage Service participation in the JS QDR GOSC at the two star level..ensures Service input.
- Develop a Joint Analytic Working Group (JAWG) to define and implement analytical vision to get at M&S tools pertinent to the full spectrum of conflict..not just conventional warfare.
- Maximize utility of QDR Dynamic Commitment Wargame as venue for Service, CINC and Joint Staff integration efforts..beginning with scenario development, metrics, data.....
- Develop web-based techniques to facilitate information sharing.
- Maximize use of technology and COTS tools and processes to assist in understanding SSC requirements.



Action Item for MORS

- Whereas WG saw many methods, tools, ideas, models, and data bases with potential broad value (e.g., CAA's predicting instability work, optimizers, exploratory analysis,...).
- WG recommends:
 - MORS consider a web-based "library".
 - No endorsement or advertising, but:
 - **"publications," models, tools, etc.**
 - **links to organizations, people, documents,...**
 - Will require discussion with sponsors (e.g., J-8, PA&E).

The working group also identified an action item for MORS. Because it saw so many opportunities for sharing ideas, knowledge, modeling, and data (including CAA's work on tracking potential instabilities of countries), it suggests that MORS consider developing a web-based library. It would not contain endorsements or advertising, but there could be a great many electronic files and links.



Engagement/Overseas Presence

Chair: Mr. Dean Free

Co-Chair: LCDR John Ruck

3 February 2000



Terminology

- NSS and NMS both use the words “engagement” and “shaping.”
- There is a hierarchical difference in descriptive use of the terms.
- Engagement is a broad NSS term
 - *Imperative for the strategy.*
- Shaping is an integrated approach to the strategy
 - Military activities are one aspect of shaping the international environment.
- In the NMS, Shaping is an element of the military strategy.
- In the NMS, peacetime military engagement encompasses all military activities involving other nations intended to shape the security environment in peacetime:
 - Particularly important task for our forces overseas — those forward stationed and those rotationally or temporarily deployed.

The first thing this group found was that any discussion about “engagement” was hampered by confusion over the terminology used. The National Security Strategy (NSS) and the National Military Strategy (NMS) both use the terms “engagement” and “shaping” in slightly different ways. In the NSS, engagement is a broad imperative for the strategy with shaping as the approach to the strategy. In the NMS, shaping is an element of the military strategy, with peacetime military engagement as one part of shaping.

According to the NMS, “peacetime military engagement encompasses all military activities involving other nations intended to shape the security environment in peacetime.”



Differences in Views of Engagement

- Different CINCs interpret the term “engagement” differently
 - Southern Watch is engagement.
 - Northern Watch is not.
- Services view the world in light of military activities
 - Navy/USMC: Think in terms of presence/response.
 - USA/USAF: Think in terms of engagement activities.
- Etc.

Makes Discussion Difficult....
Makes analysis problematic

Different players have different views of what constitutes engagement. Each CINC defines which activities constitute engagement in their theater by what they place in the Theater Engagement Plan (TEP). There is no requirement for standardization among the CINC's plans. For example, Operation Southern Watch is included in the CENTCOM TEP, but Operation Northern Watch is not included in the EUCOM TEP.

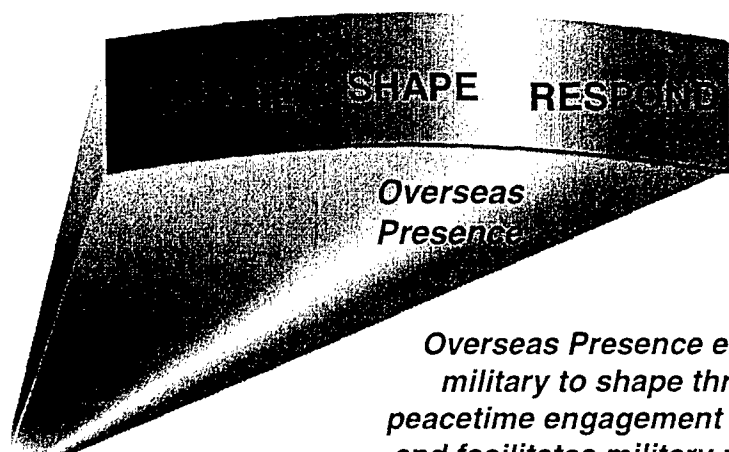
Also each of the services views engagement uniquely. The Joint Staff does not have a clear definition in CJCSM 3113.01, Theater Engagement Planning. It states the key determinant of whether a specific activity is included in the TEP is whether or not it is planned by the CINC to have a significant engagement role in the theater strategy. (p. A-12)

These multiple definitions and multiple views of engagement make the discussion of engagement more difficult.



SCOPE

Relationship of Shaping to Engagement to Overseas Presence



Imperative of Engagement

Overseas Presence does not fit neatly under the shape umbrella. Overseas Presence enables the military to shape through peacetime engagement activities, facilitates military response, and allows forces to prepare through training with allies in regions in which forces may be called upon to fight. In the case of the Navy, it is the combination of presence of combat-credible forces and engagement activities that shapes the environment.

Overseas Presence also enables deterrence which itself falls both under Shaping and Responding.



Analytical Subject Areas/Approaches

- Connection between activities and objectives
- Quantifying effectiveness of deterrence and engagement
- Prioritization of objectives
- Data analysis of past activities
- Cost benefit analysis of activities
- Assessing force structure to support a given level of presence and/or engagement activities
- Projecting future level of effort
- Analysis of alternative futures

Analyzing engagement and forward presence can be broken down into a number of areas.

The first area of analysis is the study of the linkage between the military engagement activities and the objectives they are meant to achieve. Studies of the connection usually either attempt to show a correlation or attempt to show cause and effect.

Related to the first area is analysis aimed at somehow quantifying the effectiveness of deterrence and engagement. These areas could be aided with the analysis of data from the past.

Given that the above problems can be solved, analysis could help prioritize the objectives since the resources used to carry out the objectives will always be limited.

Another area in which techniques would be of benefit for the decision maker is cost - benefit analysis. There is much work to be done in developing both costing and the quantification of benefits.

Once the required level of activities is determined, the next area for analysis is to determine the total force structure required to support these activities. This appears to be the easiest area to quantify.

Since the Department of Defense (DoD) is interested in building the forces necessary for the future, analysis must consider a range of possible futures. Additionally, some method of predicting the level of effort which would be required of forces would be useful to help plan the size and capability of future forces.



Available Tools

- A Global Assessment Tool for Engagement (AGATE) - JS
- Theater Engagement Plan MIS (TEPMIS) - JS
- FORSAT - Navy Force Structure Analysis Tool - OPNAV N8
- Force Allocation Comparison Tool (FACT) - Army Center for Land Warfare
- Marine Corps Force Allocation and Deployment System (MCFADS)
- Dynamic Commitment (DC)
- Historic Research
- Decision Aids
- Full Spectrum Analysis - USAF AF/XO

AGATE is a tool currently under development by the Joint Staff that will be used to analyze peacetime engagement activities. The tool will show links from Prioritized Regional Objectives (PROs) to Theater Objectives to planned engagement activities. It will also include force availability, substitutability and assessment modules.

Theater Engagement Plan MIS (TEPMIS) was originally developed by EUCOM to support its theater planning process. A working group is adapting the EUCOM TEMPMIS for use by all CINCs as part of the JS/J7 TEP review process. The next version of TEMPMIS (V 6.0) will be installed for all TEP users to support electronic submission and review of the TEP as well as providing a tool to track TEP execution. The AGATE tool will be modified and incorporated in later versions of TEMPMIS to allow assessment and evaluation to take place at CINC staff levels.

The Force Structure Analysis Tool (FORSAT) is under development by OPNAV/N81. FORSAT is designed to analyze the effect on Naval forces of crisis response and peacetime forward presence.

Force Allocation & Capability Tool (FA&CT) will be the gaming tool used by the Army in the Joint Staff's Dynamic Commitment (DC) Wargames. It will allow the player to select the Mission Task Organized Force (MTOF) for each scenario played from a MTOF Library, apportion forces at UIC level of detail, and track on-going activities, deployment history and reconstitution time for all Army units.

Marine Corps Force Allocation and Deployment System (MCFADS) model parallels the functions of FA&CT for the USMC.

The Dynamic Commitment Wargame is a strategic-level, force allocation wargame series being held in support of QDR with four major objectives: 1) to identify the suitability of the POM force to meet future challenges; 2) to identify key risks; 3) to build a baseline database for the QDR process; and, 4) to build a group of informed experts.

Full Spectrum Analysis was developed by USAF AF/XO.



Existing/On-going Analyses

- Dynamic Commitment (DC)
- REPJWCA Assessment
 - TEPMIS implementation study
 - TEPMIS Assessment Tool
- Navy Forward Presence Workshops
- Ongoing TEP CINC analysis
- USAF AEF implementation studies
- European and Asian Posture Reviews (OSD)
- Various studies at war colleges, etc

Many studies and analyses are underway in the area of Forward Presence and Engagement.

Dynamic Commitment is a wargame sponsored by Joint Staff/J8 which studies the allocation of forces to engagement and forward presence activities along with response to crises.

The Regional Engagement and Presence Joint Warfare Capabilities Assessment (REPJWCA) includes an effort to fully implement the TEPMIS which will be useful for collecting data on engagement activities. The TEPMIS Assessment Tool will build on AGATE to provide the tools necessary to begin the analysis of many aspects of engagement.

The Navy Forward Presence Workshops are designed to trace the utility of Naval Forward Presence from the Regional Strategic Interests and Threats to the CINC's Regional Military Objectives to Military Tasks to Required Military Capabilities.

Each CINC is constantly evaluating the ongoing engagement activities in his AOR as well as planning future engagement activities.

The Air Force has a number of studies underway to determine how best to implement the AEF concept

OSD has just completed the European and Asian Posture Reviews which include the place of engagement and forward presence in the theaters in the future.



Significant Analytical Issues Surfaced

- Differences in use of terminology
- Quality of data
- Overlap of Areas of Analysis (AoA)
 - Multiple dependencies
 - Difficulty in assigning cost to activities
- Quantification of Measures of Merit (MoM)
- Difficult to determine correlation/cause and effect
- Variable time delays between events and effects
- Strategy to task linkage
- Unknown end-states
- Prioritization of objectives

During the course of the workshop, a number of significant issues surfaced.

First was the difficulty with terminology in this area, as discussed in the beginning of the brief.

In order to conduct analyses, data about past engagement activities are required. The opinion of the group was that these data were lacking, but while past data probably cannot be recaptured, TEPMIS should go a long way to making these data available in the future.

Another issue was how to develop more quantifiable measures for valuing peacetime engagement activities. Each CINC has staff activity underway to quantify the value of its activities. Most are constrained to budget year or program year and emphasize the execution year to refocus the efforts underway. Estimation of value in the out years is not possible without significant improvement in data from each theater, to include resource data for each activity.

Some CINCs have attempted to quantify end states for specific areas in their Country Campaign Plans (CENTCOM). A set of measures of effectiveness is being implemented but is subject to data limitations noted above.

Strategy-to-task linkage, based on AGATE results, show that theater inputs provide links from multiple PROs to each activity, complicating the independence requirements of most decision analysis applications. More selective association or linkage from PROs to theater objectives to country objectives and activities is required.

Prioritization of objectives is not present at all levels. Currently, the national level PROs are implemented in tiers (1, 2, or 3) but with no internal prioritization. There is a mismatch between the geographic world sections of the State Department and the Unified Command Plan (UCP) that must be coordinated between commands or by the Joint Staff. Effective prioritization should begin with the national level and work downward.

The analytic task of cost benefit analysis cannot even begin until we can quantify the benefit.



SUGGESTED ANALYTICAL IMPROVEMENTS

- FOR QDR 2001 preparation
 - Definition of Terms
 - Continue service efforts towards quantifying the effect of engagement and presence on PERSTEMPO/OPTEMPO
 - Make latest TEP information available
- For future Joint Analysis in 21st Century
 - Complete and compatible databases
 - Incorporate TEPMIS in future Dynamic Commitments (DC)
 - CINC/JS/Service TEP data
 - Improved Methods for Showing Effects of Engagement Activities

A number of things help the analysis community in the near-term. First, continued discussion among analysts from the Services, OSD, Joint Staff, and other analysts will help with the understanding of definitions in this arena. The development of tools to aid in quantifying the effects of engagement and presence on the forces will be useful both during and after Dynamic Commitment and should be continued.

Dynamic Commitment, which will have implications for the analysis of the effect of engagement and overseas presence on PERSTEMPO and OPTEMPO, will begin in June 2000.

Work on the new Theater Engagement Plans (TEP), already underway, will not be useful to early QDR analysis (not due until October 2000). Existing TEP data provided in October 1999 may be useful to set a better baseline for Dynamic Commitment, but the data must be incorporated into AGATE by the JS to translate force requirements and availability across all theaters consistently.

In the long run, more complete data bases for engagement activities should be developed to allow the CINC and the Services more visibility into theater engagement activities. TEPMIS data should be specifically included in future Dynamic Commitment games to explicitly capture the effect of these activities and to track the effect of crisis response on the ability to carry out TEP's. Historical information from past years must be accommodated in TEPMIS to allow correlation analysis between objectives/activities supported and resources expended.

Research should continue into methods that show promise in being able to quantify the effects of engagement activities.



Summary

- Disagreement on definitions get in the way of focusing discussion on analysis.
- Tools for analysis of stress on forces given demands are making progress.
- (As always) data gathering needs improvement.
- Methodologies for showing cause and effect are immature or non-existent.
- Some areas of analysis will remain qualitative vice quantitative.



**Small Scale Contingencies/
Operations Other Than War**

Chair: COL Forrest Crain

Co-Chair: Dr. Dean Hartley

3 February 2000



Whatever they are called, Small Scale Contingencies (SSC) or Operations Other Than War (OOTW), their conduct and results shape our geopolitical environment. Allies and competitors gauge our values and national will by the size of our presence. They gauge our competence by the results. The results also contribute to shaping the future. SSC/OOTWs are thus part of our “Shape” strategy, as well as being part of our “Response” to events. This subgroup, chaired by COL Forrest Crain and co-chaired by Dr. Dean Hartley, explored the state of analysis for SSC/OOTWs.



Objectives

- Analytic Subjects: Identify potential analytic subjects in the SSC domain.
- Analytic Tools: Identify and assess available analytical tools to address subjects (capability, limitations, etc) Highlight analytic tool shortfalls.
- Measure of Merit (MOM): Identify and assess MOMs for analytic subjects in the SSC domain (appropriateness, utility, etc).
- Data: Identify and assess data needs to support analytic tools to address subjects (robustness, limitations, etc). Highlight data voids.
- Suggest future Courses of Action to improve usefulness of QDR 2001.
- Suggest ways to improve joint analysis in the 21st Century.
- Identify issues and concerns for QDR 2001

The objectives for the SSC/OOTW subgroup are based on the mini-symposium Terms of Reference (TOR).

The “analytic subjects” are presented as ten analysis challenges and one set of unresolved analysis issues. Except for the first challenge, the analysis challenges represent analyses that will or might be required in QDR 2001. The subgroup believes that the analyses of the first challenge should, but won’t be, part of the QDR process. This lack engendered a search for other missing analyses, creating the unresolved issues slide.

The “analytic tools” are organized using the taxonomy of analysis tools developed in two USPACOM workshops and one MORS workshop on OOTW analysis support.

The “Measures of Merit (MOM)” are organized by four dimensions of interest. Only a few examples are presented to help flesh out the concept. More information is available in proceedings from a workshop held by The Technical Cooperation Program (TTCP) (see references).

The “data” are described in terms of types of data required and issues of concern relating to the data.

The remaining items are covered in the final slides.



SSC and OOTW: Goals and Composition

- Goals
 - Explore analytic subjects, tools, data and MOEs for SSCs.
 - Identify issues and concerns to improve QDR 2001 and 21st century joint analysis.
- Composition
 - COL Forrest Crain - Chair
 - Dr. Dean Hartley - Co Chair
 - Dr. Warren Switzer
 - Dr. Phil Barry
 - Major Glen Roussos
 - Ms. R. Beall
 - Mr. Bruce Harris
 - Mr. Karsten Englemann
 - ...and the usual suspects

The goals are succinct expressions of the objectives. The listed participants comprised the panel of knowledgeable people who formed the core of the working group. Approximately 30 additional workshop participants completed the membership of the working group. Known additional participants:

Akst, Dr. George

Allen, LTC James M.

Bower, MAJ Mark A.

Brundage, Mr. William H.

Butt, Ms. Angela Ellen

Favela, Mr. Richard E.

Gangsaas, LCDR Aasgeir

Ghelber, Mr. Craig S.

Hope, LTC Timothy W.

Iwanski, Ms. Susan M

Kunder, Mr. James R.

Lavoie, Mr. Kenneth E.

Lidy, Mr. A. Martin

Loesekann, Mr. Michael R.

Loudin, Ms. Margaret M.

Mahony, MAJ Michael F.

McKie, Mr. Franklin

Mills, Mr. Giles III

Moore, Ms. Brenda

O'Brien, Mr. James R.

Oyler, LtCol Roxanne A.

Rothmann, Mr. Harry E.

Sanders, Mr. Danny W.

Schmith, LTC Stephen G.

Schwartz, MAJ Karl Otto

Simmons, Ms. Elaine R.

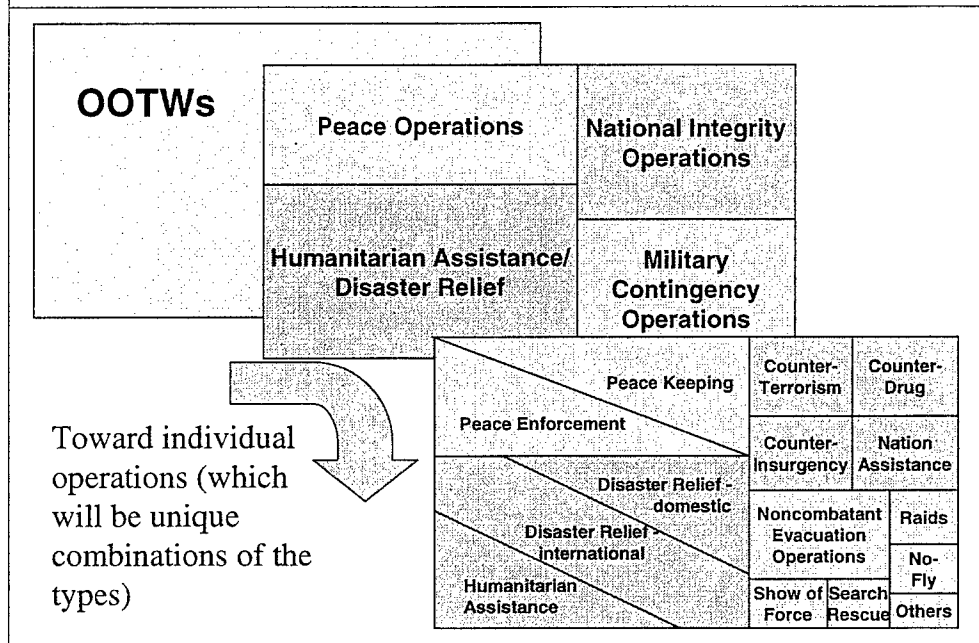
Smyth, Mr. Edward A.

Steinrauf, LTC Robert L.

Stephan, LtCol Bob



OOTW Taxonomy



This OOTW taxonomy was created through the actions of two workshops sponsored by USPACOM and one sponsored by MORS. Text versions include a more detailed listing of “pure” missions; however, almost no actual mission consists of a single “pure” type. Most missions begin as a combination of types and most add or delete types over time. Thus, the taxonomy doesn’t prescribe types of OOTWs; it provides a vocabulary for describing them.



Current SSC/OOTW Analysis Challenges: SSC/OOTW Success

- How do we define ability to accomplish SSCs? How does one define success, end state? Is the nominated force sufficient for the particular vignette? How do we measure the adequacy of projected DoD program for achieving US objectives for SSC operations?
- What is the effect of SOF engagement activities (Peacetime PSYOP, FID, etc.) on NCA/Theater CINC's flexible deterrent options and the likelihood, intensity and duration of conflicts?

The next 10 slides describe the analysis challenges. Each contains a description and an evaluation of where we are analytically. The first analytical challenge begins with a simple question, “will we succeed?” Naturally, the details and ramifications become complex.

The tools that are required to fully meet this challenge are inadequate: rated LOW.

The data are inadequate, but can be created: rated LOW-MED.

The MOMs depend on the situation.

Overall rating: LOW.

Prospects for improvement, now technically possible: rated MED.



Current SSC/OOTW Analysis Challenges: MTW Issues

- What is the effect of SSCs on MTW?
- What is the effect of POE movement vs. simultaneous SSCs with an MTW (e.g., what if you can't disengage from an OOTW to go to an MTW)? What are the implications of rapidly disengaging from SSC operations?
- What is the potential impact of SSC operations on MTW posture?
- What MTW elements are most impacted by SSCs?

The second challenge addresses the question, “how do OOTWs affect our ability to fight and win MTWs?”

The tools that are required to meet this challenge are adequate, but uncoordinated: rated MED.

The data require work: rated MED.

The MOMs are fairly well developed: rated HI.

Overall rating: MED.

Prospects for improvement: rated HI.



Current SSC/OOTW Analysis Challenges: Readiness Issues

- What is an SSC's effect on TEMPO? What is the tradeoff between PERSTEMPO or OPTEMPO vs. Shortfalls? What are approaches for reducing stress/tempo problems?
- What is the cumulative impact of SSCs on force readiness?
- What is required for post-SSC reconstitution of units?
- What is an SSC's impact of readiness?
- What is the effect of force structure on readiness, OPTEMPO, sustainability, mobility?
- What is the impact of contingency and other operations on SOF readiness levels?

The third challenge revolves around readiness questions.

The tools that are required to meet this challenge are adequate, but uncoordinated: rated MED.

The data require work: rated MED.

The MOMs are fairly well developed: rated MED-HI.

Overall rating: MED.

Prospects for improvement: rated HI.



Current SSC/OOTW Analysis Challenges: Structure and Doctrine Issues

- What is the relationship between the force posture and force structure for SSCs?
- What changes to the force structure and/or doctrine would better enable US military forces to successfully conclude SSC?
- How many SSCs can be undertaken?

The fourth challenge is formed by grouping questions that relate to structural and doctrinal issues.

The tools that are required to meet this challenge include the “success” tools: rated LOW.

The data require work: rated MED.

The MOMs depend on the definition of success.

Overall rating: LOW-MED.

Prospects for improvement: rated MED.



Current SSC/OOTW Analysis Challenges: Constraint Issues

- What is the tolerance for collateral damage and US losses for a particular SSC?
- What is the effect of force ceilings?
- How does the analysis depend on the type of SSC?
- How can the capabilities of global partners (military and civilian) be factored into the analysis?
- How can the division of responsibilities between the military and other agencies be factored into the analysis?
- What are the capabilities and assigned responsibilities of other US Government agencies, other donor organizations IO s, NGOs, commercial businesses?

The fifth challenge is characterized by analysis problems caused by constraints on the military solutions that might otherwise be proposed for OOTW missions.

The tools that are required to meet this challenge are adequate, but uncoordinated: rated MED.

The data require work: rated MED.

The MOMs can be developed: rated MED.

Overall rating: MED.

Prospects for improvement depend on a decision to work the problem: rated MED.



Current SSC/OOTW Analysis Challenges: Special Resource Issues (1 of 2)

- What are requirements for specialized units for SSCs? (e.g., HUMINT, CA)? What critical equipment/skills are required for engagement activities and various contingency operations?
- What are the specialized command and control requirements? What are the C4ISR requirements for operations and "reach-back" if major support elements remain outside an operational theater?
- What are the resource needs e.g., PGMs for OOTWs per year?
- What are the relative importance of certain types of DoD capabilities to support SSCs - Composition, size and training for JTF HQ and rotational (on call) units (CS, CSS and combat) to provide Joint capability to respond to SSCs?



Current SSC/OOTW Analysis Challenges: Special Resource Issues (2 of 2)

- What are the utilization rates and tasked core/collateral missions for each SOF major force element or platform? What are the reserve components utilization rates and contribution to the core/collateral mission?
- What mission shortfalls occur in contingency and theater engagement activities?
- Is there sufficient lift to deliver SOF forces to the operation in time to be effective? What are the logistical requirements to sustain engagement activities and conflict?

The sixth challenge concerns questions of resources needed to support SSC/OOTWs, especially those resources that are particularly needed by these types of operations.

The tools that are required to meet this challenge are adequate, but uncoordinated: rated MED.

The data require work: rated MED.

The MOMs are fairly well developed: rated MED.

Overall rating: MED.

Prospects for improvement: rated HI.



Current SSC/OOTW Analysis Challenges: Unique Mission and Situation Issues

- How should refugee resettlement be handled?
- How should assisting in local elections be handled?
- How should military support of civil laws and order and public security, not just military security, be handled?
- What are the roles, responsibilities and resources for liaisons to support both SSC responses and engagement activities?
- What is the role of contract support personnel and what military forces can/should they replace?
- What is the role of international, NGOs and private voluntary organizations (IO/NGO/PVO) in contingency operations and what military forces can/should they replace?
- What is the effect of non-combatants/displaced persons in the battle area and how does that affect civil affairs missions (civil-military vs. civil administration operations)?

The seventh challenge concerns the unique or uncommon mission and situation characteristics of OOTWs and the analysis problems that result.

The tools that are required to meet this challenge need development: rated LOW.

The data require considerable work: rated LOW.

The MOMs are fairly well developed: rated MED.

Overall rating: LOW.

Prospects for improvement, require a decision to improve: rated LOW.



Current SSC/OOTW Analysis Challenges: Cost Issues

- What are funding requirements to support SSCs? (Can projections be based on historical information as to the cost of SSCs?)
- What is the additional cost of engagement and contingency activities?
- What is the effect of forward basing on personnel, operational costs, support costs, C4ISR and mobility requirements?
- Do engagement activities reduce the cost of contingency operations by reducing the likelihood, intensity and duration of conflicts?

The eighth challenge is comprised of analysis questions involving cost.

The tools that are required to meet this challenge are adequate: rated MED.

The data require work: rated MED.

The MOMs are fairly well developed: rated HI.

Overall rating: MED.

Prospects for improvement: rated HI.



Current SSC/OOTW Analysis Challenges: Method Issues

- What tasks are associated with SSCs (categorize common and unique tasks)?
- Is building alternative SSC management capacity a good idea (such as the African crisis response initiative)?
- How should the coordination/collaboration/command/control arrangements between military force command and civilian authority (e.g., UN High Commissioner) be created?

The ninth challenge deals with the secondary analysis problems that result from the methods needed to deal with more primary OOTW analysis problems.

The tools that are required to meet this challenge are inadequate, depending on “success” tools: rated LOW.

The data require considerable work: rated LOW.

The MOMs are depend on the definition of success.

Overall rating: LOW.

Prospects for improvement depend on creating “success” tools first: rated MED.



Current SSC/OOTW Analysis Challenges: Training Issues

- Is more training needed on SSCs?
- What training is needed?
- How do you measure training effectiveness?
- Does training for SSCs negate or enhance training for war?

The tenth challenge concerns the analysis of training issues.

The tools that are required to meet this challenge are adequate, but uncoordinated: rated MED.

The data require work: rated MED.

The MOMs are fairly well developed: rated HI.

Overall rating: MED.

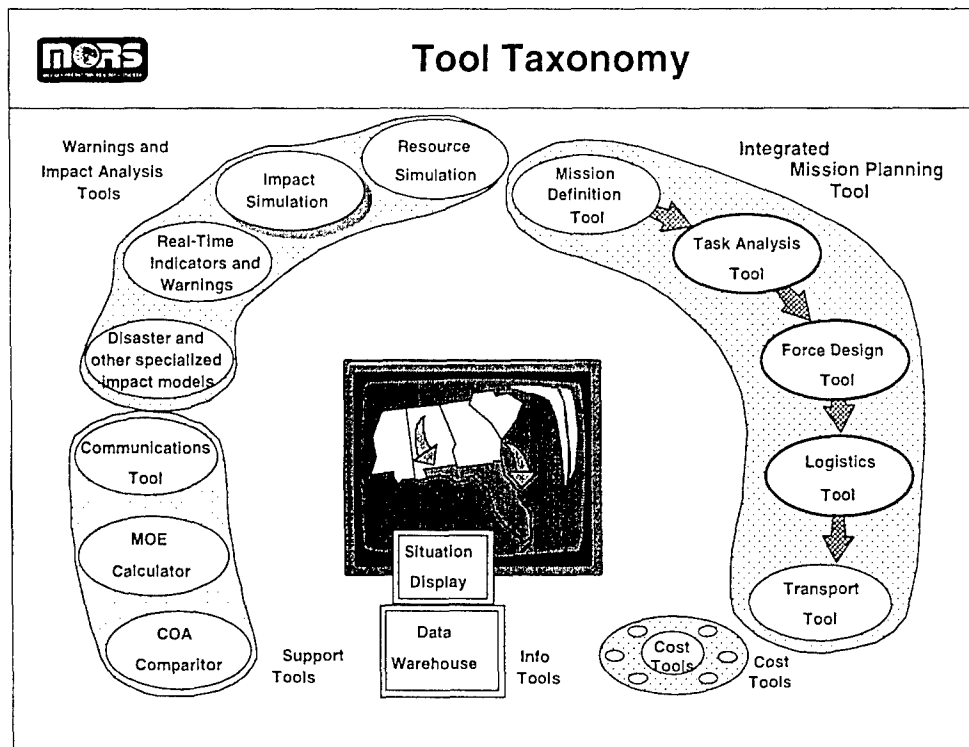
Prospects for improvement depend on creating “success” tools: rated MED.



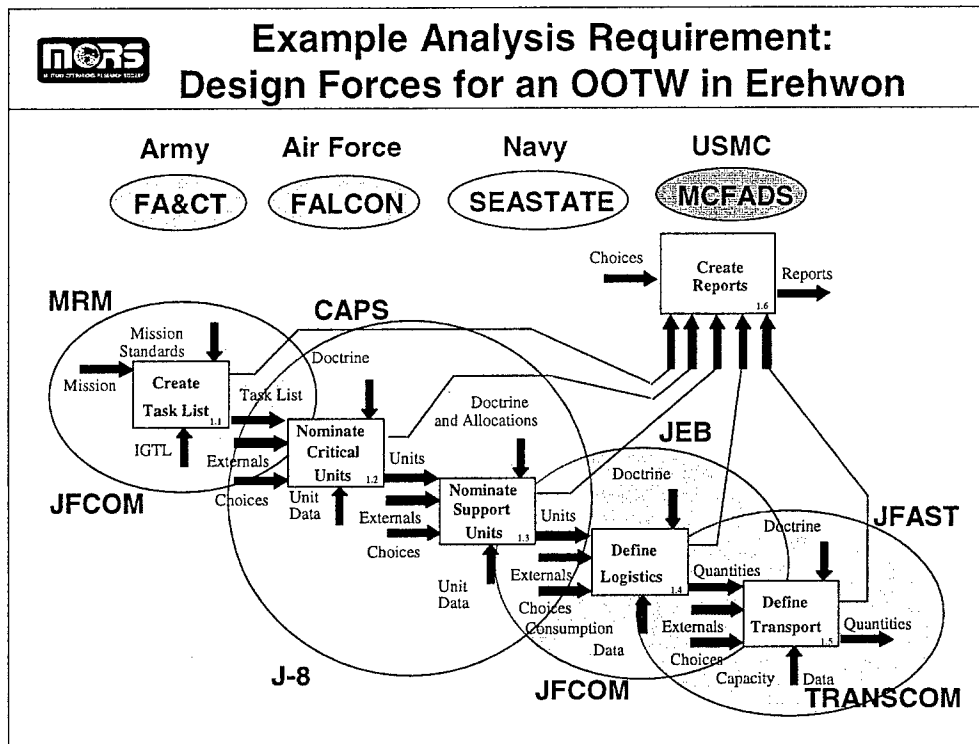
SSC/OOTW Unresolved Analysis Issues

- How can we restructure the US Government interagency process to better manage SSCs?
- How do we quantify the importance of SSCs to DoD's mission as compared to MTW?
- How do we balance low risk but high frequency operation with high risk low frequency operations?
- How do we recognize and measure success?

Some of the analysis issues require analysis extending beyond the military framework. They cannot be resolved by the military, but must include the military.



The various analysis needs relating to OOTWs have been organized into tool categories, each category containing the needs that could be served by a single type of tool. Naturally, any real-world problem is likely to span several categories. For example, the connections that might be made in the process of "JTF force structure evaluation" are as follows. Warnings of an impending OOTW flow from the "real-time indicators and warnings" category to the "situation display" and "data warehouse" categories. The flow proceeds to the "mission definition tool" category. As the flow proceeds through the "integrated mission planning tool" super-category, it may receive input from the "disaster and other specialized impact models" category. The tentative plan is evaluated for cost in the "cost tools" category and for effectiveness in the "impact simulation" category.



Currently, there are few analytical tools that are specifically designed to address the problems of OOTWs; however, there are tools that are applicable. These tools provide both a stop-gap means of performing analyses now and provides prototypes for designing a better, more inclusive tool. (This slide comes from work sponsored by OASD (SO/LIC) on OOTW Force Design Tools.) Briefly, the Mission Requirements Module (MRM) of USJFCOM can be used to create the task list for a mission. The Contingency Analysis and Planning System (CAPS) of J-8 can be used to define the (joint) military units needed to accomplish the mission. The Joint Electronic Battlebook (JEB) of USJFCOM can be used to define the logistics requirements. And the Joint Flow and Analysis System for Transportation (JFAST) of USTRANSCOM can be used to define the transport requirements. The Army, Air Force, Navy and Marine Corps models contain additional desirable features (such as cumulative degradation of equipment and readiness) that should be included in a unified tool.



SSC/OOTW Tools: Force Design (1 of 2)

- SOFAS-DCBY2K Special Operations Force Allocation System Dynamic Commitment Beyond Year 2000 (USSOCOM)
- FA&CT Force Allocation and Capabilities Tool (Army)
- FSA - Full Spectrum Analysis Tool (USAF)
- MCFADS - Marine Corps Force Allocation and Deployment System (USMC)
- MRM Mission Requirements Module (JWFC/J-7)
- SABRINA (UK/OSD PA&E)
- FORSAT Force Structure Analysis Tool (Navy)
- CMMS Conceptual Models of the Mission Space (DMSO)



SSC/OOTW Tools: Force Design (2 of 2)

- SEASTATE (Navy)
- ATP Anti-Terrorism Planner (US Army Corps of Engineers)
- CAPS Contingency Analysis and Planning System (J-8)
- ELIST Enhanced Logistics Intratheater Support Tool (USTRANSCOM)
- FALCON Force Allocation and Contingencies (Air Force)
- HART Humanitarian Assistance Requirements Tool (ANSER)
- JEB Joint Electronic Battlebook (USJFCOM)
- JFAST Joint Flow and Analysis System for Transportation (USTRANSCOM)

This list of force design tools is incomplete. More tools (of all categories) that might be useful in OOTW analysis are described in a database maintained by J-8. A copy of this database will be posted on the MSIAC website (<http://www.msiac.dmsomil>).



SSC/OOTW Tools: Impact Analysis

- GCAM SSC Applications General Campaign Analysis Model (Navy)
- CATS Consequence Assessment Tool Set (DTRA)
- CMAC Counternarcotics Modeling and Analysis Capability (USSOUTHCOM)
- DEXES/CAM Deployable Exercise System/Civil Affairs Module
- NationLab (USSOUTHCOM)
- SENSE Synthetic Environment for National Security Estimates (IDA)
- SIAM Situational Influence Assessment Module (JWAC)
- Spectrum (US Army National Simulation Center)

This list of impact analysis tools implies more capability than actually exists. These tools either provide programming environments, specialized functionality (e.g., counternarcotics) or training oriented models.



SSC/OOTW Tools: Indicators and Warnings

- ALADUN Africa and Latin America Database (Evidence Based Research, Inc.)
- AVI Assessing Vulnerability to Instability (Evidence Based Research, Inc.)
- GDIN Global Disaster Information Network (Department of State)
- GEOWARN Global Emergency Warning and Relief Network (NASA)
- HEWS Humanitarian Early Warning System (UN)
- PANDA Protocol for Assessing Nonviolent Direct Action (Harvard)
- PERICLES Political and Economic Risk in Countries and Lands Evaluation Study (US Army Center for Army Analyses)

These and other indicators and warning tools represent a beginning, not a completion of research into this tool category.



SSC/OOTW Tools: Data

- UOB Unit Order of Battle Data Access Tool (DMSO)
- FDP KAT Formalized Data Products Knowledge Acquisition Tool (DMSO)
- DOD Capture, Knowledge Acquisition Tool (DMSO)
- GEDS Global Events Data System (JWAC)
- KEDS Kansas Events Data System (University of Kansas)
- VIC Virtual Information Center (PACOM)
- JVAC Joint Virtual Analysis Center (J-8)

SSC/OOTW Tools: Cost

- COST Contingency Operations Support Tool (OSD-C/IDA)

Data for OOTW tools are sparse, partly because OOTW tools and their requirements for data have only recently been recognized as important.

The COST tool is new and is well done.



SSC/OOTW Tool Notes (1 of 2)

- There are innumerable tools, versions of tools, models and so forth that have varying degrees of applicability to SSC analysis. Therefore, a list of tools is of limited use both because of its size and complexity and because of its continued growth and change.
- What is of greater utility is a typology of the tasks that these analytic aids need to help us with. At its simplest level this typology is:
 - What: (Tasks etc. that need to be accomplished) – Action Required: Identify tasks
 - Who: (Capabilities to accomplish the what) – Action Required: Identify Who
 - How: (What is done by the capability to accomplish task) – Action Required: Identify How
 - Store: Archive the above in retrievable, analyzable, exportable form that is compatible with other common systems (e.g., Microsoft PC- Based Systems).

The J-8-maintained database contains some of the required information about the tools; however, it needs to be scrubbed by people who have used the tools to increase its value.



SSC/OOTW Tool Notes (2 of 2)

- Model development should focus on accurately capturing service processes and data and producing joint level results without losing service fidelity.
- Modeling SSC outcomes is a task for the future and it is little comfort to realize that we aren't really that far behind those who model major theater war.



SSC/OOTW MOMs (1 of 2)

- Measures of Merit (MOMs) provide the rationale for actions
 - A complete and accurate set of MOMs, when functionally connected to potential actions, indicates which actions lead to desired results, which to undesired results, and what the proportions are of mixed results.
 - The process of determining MOMs for a particular SSC/OOTW is a valuable team-building and mission-defining experience.

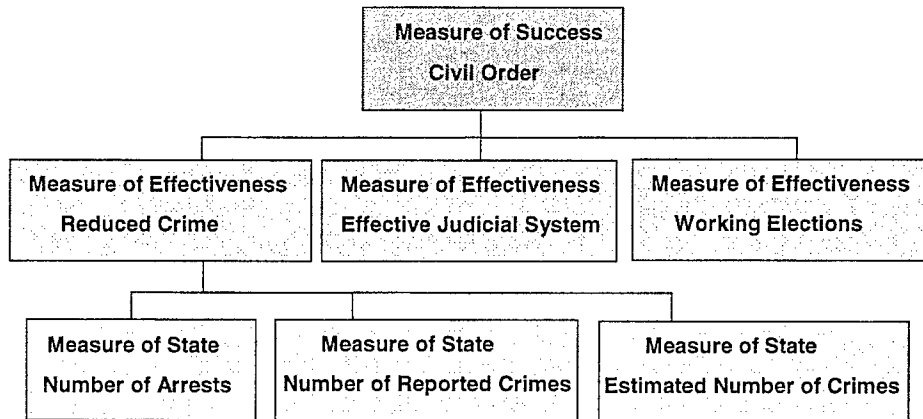


SSC/OOTW MOMs (2 of 2)

- MOMs may be categorized in four ways
 - Measures of input (e.g., meals delivered) vs output (e.g, health status)
 - Time relationship: during an operation, prior (indicators and warnings) and post (lessons learned)
 - Whose value system is used
 - the military mission
 - the overall mission (e.g., UN or ethical mission definition)
 - impact on US military forces and capabilities
 - impact on US strategic goals
 - Hierarchical status
 - measure of state: observable facts
 - measure of success: final value
 - intermediate measures: measures of effectiveness (MOEs)

MOMs are critical for driving the performance of operations and should be recognized as critical in the analysis, also.

Example Measures of Merit Hierarchy



The measure of success depends on the mission. The things that can be observed (measures of state) depend on the situation. The connections are difficult to derive. Considerable controversy arose in the subgroup when one of the measures of effectiveness was presented, showing actual calculations from measures of state.



SSC/OOTW MOMs

- Overall mission, success
 - Regional stability, democratization, economics, etc.
- Intermediate measures
 - Increased casualties
- State measures
 - Measures of conditions within the affected country/countries
- Impact on US forces and capabilities
 - Stress (caused by involvement in SSCs) on national defense resources
 - OPTEMPO
 - PERSTEMPO - PERSTEMPO for operators and support personnel
 - Requirement usage of critical skills (LD/HD)
 - Impact of SSCs on unit/force structure shortfalls
 - Requirement for and usage of critical skills, units, platforms or equipment (both SOF and Non-SOF unique)
 - C4ISR support rqmts. Generated within and between theaters by contingency operations

The examples are provided to illustrate the categorizations.



SSC/OOTW MOMs

- Impact on US strategic goals
 - How much does each SSC detract from the MTW?
 - Measurable impact of SSC on the MTW risk to warfighter.
 - Impact of SSCs on force projection capability to MTWs.
 - Costs for deployment, operations in support of engagement activities, contingency operations, contract support and other incurred costs.
 - Impact of varying levels of Peacetime engagement activities (Peacetime, Psyop, FID, exercises, etc.) on frequency and intensity of contingencies.
 - Changes in infrastructure, recruiting, training pipelines, retention, forward basing, PCS rates that affect operations.
- Input measures
 - Measures of efforts to provide assistance.
 - Coalition involvement/capabilities .



SSC/OOTW MOM Issues

- Notes on Measures of Effectiveness (MOEs):
 - MOEs are intermediate MOMs between measures of success and measures of state (observables).
 - All MOEs are determined by results. Results may be end results or step/phase results.
 - Effectiveness and efficiency are not the same. Excessive inefficiency may preclude effectiveness. In terms of finite resources and a varying milieu, efficiency relates to effectiveness as a matter of degree.
 - Care must be taken to understand what the metrics actually measure. Effectiveness often is a composite of a series, the ultimate result of which may be expressed in widely different form.
- Indicators and warnings might lead to early intervention.
- MOEs are quantitative and measures of success are qualitative (but may be converted to quantitative measures with Lickert scales).

The decisions on which Measures of Merit (MOM) are important for a particular operation and how they are related are difficult and critical decisions.



Representative SSC/OOTW Data Types

- Intel Data
- Force Availability
 - POM Forces
 - Status of Active/Reserve Component (AC/RC) units/platforms accounting for location and type of activity
 - Training/readiness status of units
- Military capabilities required
- Historical database SSC response, training, exercises, maintenance, deployments and reasonable projections into the future
- Logistics and transport
 - Consumption rates for selected logistical items
 - Mobility/TPFDD to include relevant dates, numbers of PAX and cargo tonnage/outsize Alternate force structure variations (escalating forces)
- Local infrastructure, climatology and geographic data
- Local political, economic, cultural data

The data types are representative, not inclusive.



SSC/OOTW Data Issues

- What is the standard for readiness data?
- How do you project readiness data?
- Combat readiness vs. SSC readiness vs. peace time engagement readiness?
- Quality Database for postgame analysis.
- Data exchange among participants (sharing with allies other US agencies [FBI], NGOs, etc.) and security concerns/requirements for planning, civil security.
- Assumptions that drive particular pieces of data.
- Who is using data and what is the purpose for which it is being generated?
- How to define a standard template for database?
- Clear definition of objectives before SSC begins.
- Have we identified all responsibilities that the NSC has assigned for each task?
- Identify SSC on US-only and combined.
- Intel - Quality/Detail of Intelligence input to each quarter of DC play - each vignette sensitive to time at which it is played.

The same issues that arise in combat modeling data requirements also arise in data requirements for OOTW modeling. However, there is additional complexity due to non-military and non-governmental organization involvement. Data requirements for soft factors also adds collection and validation complexities.



Assessment of Adequacy of Current Approaches

Challenge	Tools	Data	MOM	Overall	Prospects	Comments
OOTW Success	LOW	LOW-MED	***	LOW	MED	Depends on situation
MTW Issues	MED	MED	HI	MED	HI	
Readiness Issues	MED	MED	MED-HI	MED	HI	
Structure and Doctrine	LOW	MED	***	LOW-MED	MED	Depends on "success"
Constraint Issues	MED	MED	MED	MED	MED	
Special Resource Issues	MED	MED	MED	MED	HI	
Unique Mission/Situation Issues	LOW	LOW	MED	LOW	MED	
Cost Issues	MED	MED	HI	MED	HI	
Method Issues	LOW-MED	LOW	***	LOW	MED	Depends on "success"
Training Issues	MED	MED	HI	MED	MED	

This chart summarizes the assessments of the 10 analysis challenges. None of the analysis challenges are in good shape. Those parts that require mechanical accounting of items are in the best shape; however, the tools to do the accounting are imperfect. Those parts that require assessment of the success of the SSC/OOTW mission are in the worst shape because we don't know how to do the assessment. Their prospects are rated as 'medium' because there are designs that build on academic knowledge and systems requirements that could be undertaken.



Suggested future Courses of Action to improve usefulness of QDR 2001

- One joint database (as opposed to separate Service databases).
- Create a joint, end-to-end force allocation tool.
- Process matters - QDR process needs to be as explicit as possible.

QDR 2001 will occur too soon to fully address SSC/OOTW assessment; however, activities to improve the accounting processes can bear fruit. The Service force allocation tools and the joint tools that are illustrated in the Example Analysis Requirement slide (substituting the Air Force's new Full Spectrum Analysis tool for the older FALCON), taken as exemplars, provide an excellent starting point.



Suggested ways to improve joint analysis in the 21st Century

- Analytical “modules” (e.g., process, database, results) on the shelf that can be used whatever problem is posed to the analytical community.
- Begin the development of impact analysis tools to permit assessment of SSC/OOTW success. It is estimated that this will bear fruit for QDR 2005.
- Make references available to resources, literature, etc., on the MSIAC web site <http://www.msiac.dmsomil>.



References (1 of 2)

- *Operations Other Than War: Requirments for Analysis Tools Research Report*, K/DSRD-2098. D. S. Hartley III. Lockheed Martin Energy System, Inc., Oak Ridge, TN, 1996.
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- *OOTW Tool Requirements in Relation to JWARS*, Y/DSRD-3076. D. S. Hartley III and S. L. Packard. Lockheed Martin Energy System, Inc., Oak Ridge, TN, 1998.
- *United States Military Role in Smaller Scale Contingencies*, D2166. A. Martin Lidy. Institute for Defense Analyses, Alexandria, VA, 1998.
- *Analysis of US Involvement in Multiple Small Scale Contingencies - The Large Failed State*. Bill Brundage, et al. OSD(PA&E), The Pentagon, 1998.



References (2 of 2)

- *OOTW Cost Tools*, Y/DSRD-3099. D. S. Hartley III and S. L. Packard. Lockheed Martin Energy System, Inc., Oak Ridge, TN, 1998.
- *OOTW Force Design Tools*, Y/DSRD-3117. D. S. Hartley III, Richard E. Bell, Stephen L. Packard. Lockheed Martin Energy System, Inc., Oak Ridge, TN, 1999.
- *Defining and Measuring Success in the New Strategic Environment*. Proceedings of a Workshop Organized by Technical Panel JSA-TP-3 of The Technical Cooperation Program (TTCP), Ottawa, Ontario, Canada, 2-5 February 1999. G. L. Christopher, R. Dickson, J. Pritchard, eds.
- "OOTW Impact Analysis," *Proceedings of the 199 Winter Simulation Conference*. Dean S. Hartley III, Richard E. Bell, Stephen L. Packard. Winter Simulation Conference, Alexandria, VA, 1999. P. A. Farrington, H. B. Nemhhard, D. T. Sturrock, G. W. Evans, eds.

This list contains only a few of the relevant OOTW references. Each of these documents contains a list of further references. An activity should be started to gather, maintain and make available a complete list of references.



Summary

- Basic calculations of SSC/OOTW resource requirement impacts on MTWs can be done for this QDR; however, improved tools can make the job easier.
- These calculations are based on the assumption that the force designs reflect the true needs of the SSC/OOTWs; however, this assumption is tenuous at best. **There is no current ability to assess the capability of a given force design to complete a given SSC/OOTW mission successfully.**
- Creating an SSC/OOTW assessment capability is possible, but will take time and effort.
- Several other issues, such as constraint evaluation, structure & doctrine, unique mission/situation issues, and methodology issues, will also require work.
- MSIAC can provide a continuity resource.

Continuity is needed to ensure that analysis improvements continue between QDRs.



**MORS Mini-Symposium
Joint Analysis: QDR 2001 and Beyond
RESPOND Working Group**

**Chair - COL Robert D.
Clemence, Jr., USA, JCS/J-8**



Job #1: Warfighting Readiness

"The fundamental purpose of the armed forces is to fight and win our Nation's wars. The military must never lose focus on its fundamental obligations to be trained and ready for war and to secure the American homeland. The United States must continue to possess the capability to respond quickly and decisively to the full spectrum of threats and crises that may arise at home and abroad. The capability to deter and defeat nearly simultaneous large-scale cross-border aggression in two distant theaters in overlapping timeframes is particularly critical to deterrence and to America's credibility as an ally."

CJCS, Joint Planning Document, October 1999

Given the frequency of peacekeeping, peacemaking and humanitarian assistance tasks, it is plausible to argue that war is a rare event and should not be the most important factor in structuring peacetime forces. None of the Smaller-Scale Contingencies (SSCs) we face threaten our national existence or require us to risk the lives of our sons and daughters to secure our posterity. Still, we must be prepared to fight and win our Nation's wars. The alternative is unthinkable. Thus, the focus of the RESPOND Working Group has been to assess our ability to analyze and understand war in the context of an environment of several SSCs.



NMS: Other Missions

- “The US will be called upon to respond to crises across the full range of military operations.” In addition to two, nearly simultaneous warfights:
 - Multiple Smaller Scale Contingencies (SSCs)
 - Posture of engagement
 - Humanitarian Assistance (HA) Missions
 - Required Homeland Defense Tasks
- “Since the demand for US forces will remain very high, and manpower and other resources are finite, the Department must prioritize its peacetime activities to ensure its efforts are focused on those that are of the greatest importance, without sacrificing warfighting capabilities”
- “Military missions must be clearly stated, with achievable military objectives that support national political aims. . . .we must ensure that the conditions necessary for terminating military involvement and withdrawing military forces are clearly established.”



Our interest in postures of engagement and smaller-scale contingencies is motivated by their effects on our ability to conduct major theater wars. The mission to deter and defeat nearly simultaneous large-scale cross-border aggression in two distant theaters in overlapping timeframes has been the hallmark of our National Military Strategy (NMS) for the past eight years. The time delays imposed by SHAPING activities were considered for the first time in the warfighting assessments performed for QDR 1997. The Mobility Requirements Study 2005 is working today to better quantify the impact of these ongoing commitments on our mobility forces. Much work remains to be done to quantify the effects of SHAPING on combat readiness.



Emerging Threats To Consider . . .

- Combination of political and military anti-access, PGM damage mitigation, and asymmetric approaches the enemy strategy of choice to avoid decisive US combat power (JSR 99)
 - Try to erode US presence overseas over time
 - Politically/militarily deny short-leg bases for AC
 - Avoid air-air, sea-sea, ground-ground vs US forces
 - Be willing to take hits from some US PGMs but
 - Mitigate exposure, damage (decoys, DUG, etc)
 - Find ways to raise the stakes (passive coherent location, other)
- Political aversion to casualties, tendency to purchase platforms vs. munitions, recent depletion of stocks
- Perceived value of Weapons of Mass Destruction (WMD) and disruption to attack US national will

Emerging trends in political and social behavior may also affect the way we conduct and study war, necessitating adjustments in our approaches and our tools. For example, we have already incorporated detailed offensive and defensive chemical warfare routines into many of our simulations to better understand the consequences of executing our current plans in a contaminated environment. Given recent experience in OPERATION ALLIED FORCE, it is also reasonable to question whether political concern for collateral damage would change the rules of engagement and the required mix of ordnance in a major theater war. We are also becoming increasingly aware that our use and growing dependence on computers and instantaneous, secure communication is both a strength and a vulnerability of the American approach to war.



RESPOND WG Sub-Groups

- **C1: Combat Operations**
 - COL Andy Loerch and Col Rich Hanley
- **C2: Information Operations**
 - Mr. Steve Myers and Dr. Bill Kemple
- **C3: Asymmetric Challenges**
 - LTC Jerry Glasow and LTC Bruce Bowman
- **C4: Readiness**
 - Dr. Laura Junor and Teresa Coady

The RESPOND Working Group was decomposed into four sub-groups to address these issues.



RESPOND Agenda

Wednesday, 2 February

0930-1200 Joint Data Support
 Observations on JWARS
 Presentations on Theater-level Models
 TACWAR
1300-1715 IDA TACWAR
 CEM
 THUNDER
 JICM

Thursday, 2 February

0800-1200 Sub-Group Separate Sessions

One of the charges given to this Working Group was to assess the status of the key tools and data that support warfare analysis. Many improvements have been made since the last QDR that are not known outside the immediate user community. We devoted an entire day to overviews of JWARS and the theater-level combat simulation models now in use.



Working Group Objectives

- Determine the status of key tools and data that support analysis within our sub-group areas.
- Enable A common understanding of what available tools/databases can and cannot do.
- Identify deficiencies needing correction
 - Before the QDR Analysis Campaign Begins
 - For Joint Analysis Beyond QDR 2001

These presentations helped identify which sub-group issues were amenable to analysis with simulation. They also motivated later discussions on how these tools might be improved in the short-term.



Data and Tools

- The canonical 2-MTW scenarios are well-studied
 - Current time frame: Service and CINC-commissioned studies
 - FY2005: MRS 2005
- Service, Joint and FFRDC models and modeling practices have been improved
 - ISR and C2
 - Logistics
 - Chemical weapons
 - Joint capabilities
- Representation of information operations, readiness and asymmetric operations is not believed to be adequate for red or blue.

After nearly eight years of practice, we understand how to simulate the execution of two, nearly simultaneous wars in Korea and Southwest Asia. And, within the set of agreed assumptions, we understand the demands that this event would place on our forces today and in the future. Some of those assumptions, however, may not be well-founded. Although this scenario pair is supposed to be a surrogate for the spectrum of regional conflicts we might face, there is the real risk that we are tailoring our assumptions and our forces to fit these cases too exactly.

The Sub-Group reports will address the improvements and continuing weaknesses in our modeling and modeling practices for each of these domains.



Things To Do Now

- Mr. Secretary: Set an interim framework today
 - Establish the decision space
 - Select time frames of interest
 - Limit the scenario set
- Service and Joint analysis executives
 - Establish working relationships between organizations to facilitate balanced portrayal of Joint capabilities
 - Determine a best practice
 - Within each Service for service-specific issues
 - Between the Services and OSD for issues that span DoD
 - For Portraying Chemical and Biological Effects on Individuals, Weapon Systems, Units and Installations
 - For assessing and portraying risk in warfighting and other NMS missions

If we could have a few words with Secretary Cohen, with the Joint and Service Analysis Executives and with our colleagues, we would make the following recommendations.

First, the Pre-QDR issue for operations research practitioners is not which model to use, but what data is available to support the models we have. By selecting the timeframes of interest and selecting a limited number of scenarios to investigate now, we can make the best use of our time and resources.

Second, now is the time to encourage collaboration between Joint and Service analytic organizations and within service lines. Front-end consultation in the next few months can improve the quality of our separate analytical work at the height of QDR 2001 when service concerns might discourage sharing methods and data.

We are also aware of a number of current initiatives to quantify the effects of Weapons of Mass Destruction (WMD). A DoD position on WMD effects is needed before QDR analysis begins in earnest to avoid increasing the exponent on the number of cases we must consider.

Fourth, a common, useful definition of risk is needed for warfighting and other NMS missions. The risk criteria used in end-of-POM warfighting assessments by the J-8, for example, is different from the one used by J-3 in the JMRR.



Things To Do Now

- Service and Joint analysts
 - Determine a service position on how to
 - Translate system losses into personnel casualties
 - Degrade performance due to readiness shortfalls, e.g.,
 - Manning
 - Spares
 - Training
 - Munitions
 - Quantify Effects of Information Operations
 - Collect data to support scenarios and timeframes selected by the Secretary

Fifth, analysts know the shortcomings of the tools they use and have learned how to use them wisely. The Defense Authorization Act that was signed on 5 October includes language that calls for an assessment of our ability to fight major theater wars in Korea and Southwest Asia from our readiness posture on that date. The measure of effectiveness of interest is casualties, a measure that we know, from DESERT STORM experience, is difficult to predict reliably with theater-level combat models. Since questions concerning unit readiness impacts and casualties will continue to be asked, it would be prudent of us to prepare now to answer those questions quantitatively and qualitatively.

Lastly, the importance of data collection, data validation and data verification cannot be overemphasized.



Things To Do Later

- Establish a recurring joint analysis program, with a two-year frequency, to perform a budget year and end-of-POM /outyear assessment of warfighting risk.
- Use quantitative methods to inform the IPS writing process.

We have two recommendations on how to improve joint campaign analysis beyond QDR 2001.

By either careful planning or serendipitous fortune, the Mobility Requirements Study 2005 (MRS-05) effort has given us a jump start on data collection and collaborative process for QDR 2001. It has also provided a means to hone our skills and train new analysts. We would endorse the establishment of a joint analysis program to further these ends, perhaps on a two-year frequency.

As a Parthian shot, we also see merit in employing a fast-running warfare simulation model, like RAND's JICM, to playout Illustrative Planning Scenario (IPS) proposals during the drafting process. There are two significant advantages to this approach. First, the scenario can be checked for internal consistency and feasibility (e.g., deployment timelines). Second, key assumptions can be varied to determine how sensitive outcomes are to them (e.g., warning time, over-flight rights, etc.). Even more important than these benefits, it would enable those who have to instantiate and analyze these scenarios to advise those who design them.



**Combat Operation Subgroup
Chairs: COL Andy Loerch
and Col Rich Hanley**

3 February 2000

The Combat Operations Subgroup of the Respond Working Group was chaired by COL Andy Loerch and Col Rich Hanley. The group met as part of the overall Respond WG on the second day of the conference, and the discussion centered around the availability of analytical methodologies to study QDR issues regarding theater campaigns for the Major Theater War (MTW) scenarios. On the third day of the conference, the group focused on evaluating the information they had received the previous day, as well as considering the new Defense Planning Guidance (DPG) Illustrative Planning Scenarios (IPS). A comparison of the existing theater level combat models was presented by LtCol Al Sawyer, USMC, of the Joint Staff (J-8). This briefing is the product of the discussion that followed the presentations.



Working Group Members

- Ted Broyhil, Logicon
- COL Ron Bertha, CAA
- James Brady, S3I
- LTC Pete Davidson, J-8
- LTC Pat DuBois, USSPACECOM
- LtCol Brian Griggs, J-8
- COL Rich Hanley, AFSAA
- William Hulse, GRCI, inc
- LTC Bob Kazimer, USSTRATCOM
- COL Andy Loerch, CAA
- MAJ William S. Murphy, DISA
- LTC Bill Nanry, CAA
- Sharon Nichols, HQ/AFTSE Center
- Robert Orlov, J-8
- Jeff Paulus, GRCI
- Mike Poumade, GRCI
- LTC Steve Read, CAA
- Jim Stevens, OSD (PA&E)
- LtCol Paul Warhola, OSD
- MAJ Paul Webber, CAA
- Charles Werchado, N81
- MAJ Dan Zalewski, OSD
- Steve Stevens, USMC

Theater campaign analysts from all the Services, as well as the Joint Staff and OSD were well represented in the subgroup. Also, several members of the JWARS Office, and the JWARS Study Team (JST) were in attendance, and they contributed significantly to the discussion regarding the availability of JWARS for QDR 01.



Scope

- Performing theater campaign modeling to support two MTW or Near Peer Analysis.

The subgroup focused on the various methodologies available to perform MTW analysis in QDR 01. Some discussion centered on Near Peer Analysis, but to a lesser extent. The group agreed that for any such analysis to be conducted, early identification of the relevant scenarios is critical.



Analytical Subject Areas

- Examination of existing MTW modeling capabilities
- Use of JWARS in QDR 2001

The topics on this slide were deemed most important by the group. Discussion addressed the strengths and limitations of the existing models in some detail. The next several slides represent group consensus in this regard. Quite a bit of discussion arose concerning how the various models should be used, with emphasis given to the concept of "Joint Collaborative Analysis (JCA)." This discussion is also summarized on a subsequent slide.

The use of JWARS in the QDR is a controversial issue. The group addressed this issue in detail. A summary of that discussion is provided in a subsequent slide.



Available Tools

- TACWAR (configuration control)
- JICM
- THUNDER
- CEM
 - Strong ground representation
 - Part of modeling system
 - Weak air representation
 - Not widely used
- GCAM - modeling environment
 - Wide range of missions can be analyzed
 - Naval capability
 - Must develop algorithms - not responsive for new problem
- IDA TACWAR
 - Good representation of Chemical and Biological
 - Used by IDA only

This slide presents the list of existing models that were considered by the subgroup. Never was it suggested that any of the models be eliminated from use in the QDR. Each has strengths as well as limitations. The group overwhelmingly agreed that the analysis should drive the model, and not the other way around. Thus, each model has its place depending on the analytical issue being addressed.

The above summarizes the characteristics of CEM, GCAM and Institute for Defense Analyses (IDA) version of TACWAR. These were considered to be specialty models that could be used to address specific issues consistent with their strengths, or for Service analysis. GCAM was identified as a potential remedy to the lack of modeling capability in the area of maritime operations, and IDA TACWAR had strengths in the Chemical/Biological analysis area that could be extremely useful in augmenting other models during the QDR.

A more detailed evaluation of the Configuration Control versions of TACWAR, JICM and THUNDER are in the following slides.



Warfighting Assessment Criteria

1. Movement and Maneuver
2. ISR
3. Firepower
4. Logistics and Support
5. C2
6. Protection
7. Battle Outcome

G	Adequate
Y	Somewhat Adequate
P	Poor
N	Not at All

Assess the capabilities of the simulations to provide meaningful insight on these aspects of a joint campaign within the next year.

This and the following two slides were prepared by LtCol Sawyers reflecting his findings from his investigation of these models. The subgroup consensus was that his findings were consistent with the beliefs of group.



Findings: Warfighting Representation

	JICM	TACWAR	THUNDER
1 MOVEMENT AND MANEUVER			
1.1 AIR & SPACE	G	G	G+
1.2 LAND	G	Y	Y-
1.3 MARITIME	Y-		
2 INTEL, SURV, AND RECON			
2.1 TARGETING			Y+
2.2 INTELLIGENCE	N	N	Y+
3 FIREPOWER			
3.1 AIR	G	G	G+
3.2 LAND	G	G	G-
3.3 MARITIME	Y-		

G	Adequate
Y	Somewhat Adequate
	Poor
N	Not at All

This slide reflects the general weakness in the representation of maritime operations in most theater campaign models. Also noted was inadequate representation in the area of Intelligence, Surveillance and Reconnaissance (ISR).



Findings: Warfighting Representation

	JICM	TACWAR	THUNDER
4 LOGISTICS AND SUPPORT			
4.1 STRATEGIC	G	N	N
4.2 THEATER	Y	Y	G
4.3 OPERATIONAL		Y	Y+
5 COMMAND AND CONTROL			
5.1 OBSERVE, DECIDE, ACT	N	N	Y+
5.2 AIR	G	G	G+
5.3 LAND	G	Y	Y
5.4 MARITIME		N	N
6 PROTECTION			
6.1 SSM DEFENSE	Y	Y	Y
6.2 NBC DEFENSE		G-	
6.3 ASYMMETRIC THREATS			
7 BATTLE OUTCOME	G	G	G

G Adequate
Y Somewhat Adequate
Poor
N Not at All

As stated previously, the group was in general agreement with this evaluation. Note that shortcomings exist in all the models evaluated. Thus, no single model will be sufficient to answer all possible questions that might arise in the QDR. Also, the point was repeatedly made that experienced analysts, with comprehensive knowledge of the workings of a particular model, could incorporate the effects of functions not explicitly portrayed into their analysis if these effects could be described and quantified. This led to the conclusion that, although enhancement of these models was desirable, no real "show stoppers" existed.



Data Sources

- Many sources
- Long lead-time
- Values are inconsistent across the models - transformations
- Subjective inputs needed

The process of obtaining and developing data for theater campaign analysis was well understood by the participants of the subgroup. This slide characterizes some of the difficulties involved in populating the various models with data. The overwhelming consensus of the group was that it would be imprudent to wait to the last minute to collect needed data. In particular, COSAGE model output, produced by the Center for Army Analysis (CAA), and used to calibrate the ground attrition representations in virtually all the considered models, needs to be completed and distributed as soon as possible. Early data development will facilitate the validation process, and allow for operational checks to be made.



Significant Analytical Issues Surfaced

Use of JWARS in QDR

- Unlikely to be able to replace TACWAR for QDR 01
 - Training
 - Data collection
 - Lack of familiarity
- Possible contribution
 - Use JWARS as feeder model to inform other analysis efforts
 - Intra- and inter-theater logistics
 - C4ISR
 - Ship-to-shore operations

Based on the evidence presented regarding the progress that has been made in the JWARS development effort, the group agreed that it is unlikely that a fully functional version of JWARS will be ready for use in the QDR. Thus other models will have to be used to perform analysis concerning the MTWs. This conclusion was reached based on the expected time and resources needed for analysis activities to achieve an acceptable level of competence with the model, as well as the increased quantity and quality of data needed for JWARS.

However, suggestions were made regarding potential uses of JWARS even if it cannot completely fill the role that TACWAR played in QDR 97. Above are listed some areas in which JWARS is well developed, and where limitations exist in the other models that are available. The idea is that JWARS would serve as a “feeder model” that could be used to inform the others. For example, JWARS might be useful to quantify the effects of various levels of C4ISR capability in the force. The results could then be used to set the values of the appropriate parameters in other models. Since these values are frequently subjectively determined, or parametrically analyzed, a higher level of quantification could be achieved. The same is true for the other areas listed above.

We note that the group was supportive of the JWARS development effort.



Significant Analytical Issues Surfaced

Joint Collaborative Analysis

- Works best at “worker bee” level.
- Works best before resources are at risk for organization.
- Potential methods
 - Analysis centrally performed
 - Each service has access to all data and models to perform parallel analysis
 - Services resolve differences and bring insights to joint forum for consideration
 - or–
 - Analysis performed by group composed of representatives of interested organizations (DAWMS)

This slide summarizes the discussion on how all the available theater models can be used to perform theater campaign analysis for QDR 2001. While everyone agreed that a totally cooperative effort involving all the participants (Services, Joint Staff and OSD) would be ideal, everyone recognized the difficulty in achieving this high level of cooperation due to the prevailing political environment and the resources that are at stake. Therefore the above suggestions were made regarding how best to proceed. Note that both of these suggested courses of action assume complete openness in the analyses, including total availability of the data and models. It is interesting to note, that the first scheme shown above was articulated by the Air Force representative, and was supported by the Army representative.

Concern was voiced by some of the participants that the second method would get bogged down due to Service rivalries, and fall victim to some of the problems experienced in the conduct of the Deep Attack Weapons Mix Study (DAWMS).



Key Deficiencies

- Inadequate representation of maritime operations in available suite of models.
- COSAGE input needed to support all theater level modeling.
- Improve Chemical/Biological representation in JICM and THUNDER.
- Enhance THUNDER to allow warfights longer than 99 days.

This slide lists some of the limitations that exist in the available models that could be addressed prior to QDR 01. Note that some investment in time and funds would be needed to accomplish any of these model enhancements.



INFORMATION OPERATIONS

Chair: Steve Myers - JHU/APL

Co-Chair: Bill Kemple - NPS

3 February 2000

Information Operations, Sub-Group of Respond Working Group.

Thanks to COL Clemence for clear direction and guidance.

Thanks to my co-chair Bill Kemple for his assistance.



Information Operations Sub-group

- Steve Myers, JHU/APL
- Bill Kemple, NPS
- Gordon Miller, Signal Corp
- Steve Petty, Signal Corp
- Steve Olechnowicz, IDA
- Alex Levis, George Mason
- Doug MacKinnon, NPS
- Mark Youngren, MITRE
- Ric Blacksten, CACI
- Tom Denesia, SPACECOM
- Mike Ottenberg, GRCI
- Crisanna Shackelford, LIWA
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Component Coordinators:

Captain John Yurchak, USN
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Captain Tim McCully, J-39

Other interested parties:

Captain Jim Powell, USN NPS
Lt Ray Buettner, USN NPS

The participating members of the group are listed above. My apologies for any individuals overlooked or errors in spelling or organization.

I also acknowledge and thank two individuals from NPS (Powell and Buettner) for their assistance in preparing for the workshop, even though they could not attend.



Information Operations -- Agenda

- 0800-0810 Introductions/Objectives/Overview
- 0810-0830 IO in Previous QDR -- Lessons Learned
Steve Olechnowicz - IDA
- 0830-0910 Courses of Action for Information Operations
Alex Levis - George Mason University (GMU)
- 0910-0920 Break
- 0920-1010 Information Warfare and SIAM Model
Doug MacKinnon - NPS
- 1010-1030 Service Comments
- 1030-1040 Break
- 1040-1200 Discussions
- 1200-1300 Lunch
- 1300-1415 Respond Working Group

February 3 agenda.

We were fortunate to have Steve Olechnowicz, IDA, a participant on the first QDR in the Information Assurance (IA) area as our first speaker. He noted that even though they had little "hard" data to analyze, they were able to come through the process with funding support intact.

Our next two briefers, Dr. Alex Levis of George Mason University, working with Service Research Labs, and LCDR Doug MacKinnon of the Naval Postgraduate School focused on the use of influence models, or effects-based analysis. The IO group is convinced that these tools hold significant promise for improving analytical capabilities for QDR IO analysis. One challenge will be (as usual), linking these models with traditional force-on-force models, and separating/interpreting the specific IO contribution. Both efforts are being performed with significant "operator" oversight and input.



Information Operations (IO)

- QDR 97
 - “...current capabilities adequate to defend...”
 - “Critical...will be institutionalization of IO.”
- NDP
 - “Essential...will be development of a ‘knowledge system.’”
 - “...exploit advances in commercial technology.”

As stated, we started with Steve’s observations on the first QDR. It included a review of the treatment of IO in the final reports for the QDR and NDP. While the statement on capabilities adequacy was more or less true at the time, the group generally felt that the situation is worse at present. Technology advancements are accelerating, and there is probably less overall understanding of exactly where DoD stands. Clearly, vulnerabilities exist. There has been significant progress within DoD with respect to institutionalizing IO, but there is still more work to be done.

Regarding the NDP comments, development of a comprehensive “knowledge system” remains a significant challenge. Likewise, though DoD has made significant progress teaming with commercial concerns, there remains much room for improvement.



Information Operations -- Scope

Offensive IO - "...across the range of military operations at every level of war."

- Information Warfare (IW)
- OPSEC
- Military deception
- PSYOPS/Civil/Public Affairs
- Perception management
- EW (including SEW)
- Physical attack/destruction
- Special IO
- Intelligence
- CNA/D

Defensive IO - "ensure the necessary protection and defense of information and information systems"

- Information Assurance (IA)
- OPSEC
- Physical security
- Counter-intelligence
- Counter-propaganda
- EW (including SEW)
- Special IO
- INFOSEC
- COMSEC
- Computer/Network management

Also can divide into Operational/Tactical and National/Strategic

IO is normally divided into Offensive and Defensive categories. This listing reflects JCS Pub 3-13, with a few additions/modifications. It is not complete, as there are certainly additional areas (C4ISR, etc.). Note that IO impacts every traditional warfare area, hence the scope is large.

Because IO's scope is so broad, it is also worthwhile to consider other ways to characterize IO, which the group did. A breakdown into categories such as tactical versus strategic was proposed as perhaps a more useful context for analysis efforts, and should be considered.

It is also important to note, as is true with several other working groups, IO's scope clearly reaches well beyond DoD. It is an area of our national strategy that requires coordination with many other government entities, both federal and non-government (financial networks).



Analytical Areas

- Human decision making
- Decision making under uncertainty
- Optimization under uncertainty - yield management
- Game theory
- Network analysis
- Decision trees
- Modeling and Simulation (M&S)
- Marketing strategies
- System engineering
- Influence diagrams/Bayesian Networks
- Wargaming
- Risk management/vulnerability analysis

This is the listing of analytical subject areas. For MORS, the group opted to display those requiring OR tools/techniques, though there are clearly many additional areas, technical and not-so-technical that could be included. "Human decision making" is considered one of the most important, yet least understood areas. There is a tendency to push selection of appropriate analytical techniques towards qualitative assessments.



Information Operations - Existing Tools

- Accepted Joint and Service models address IO in a cursory manner or not at all, data integration is a problem
- Exercises/Training -- anecdotal
- IW/IO M&S
 - SIAM (top-level influence)
 - VITE (process)
 - CAESAR II/EB (process and influence)
- JWARS -- Question availability for QDR. Good C4ISR and simulation infrastructure including some IO modeling
- Mostly qualitative structured analysis, not model based

The Respond Working Group received briefings all day Wednesday on the various models that DoD could use to analyze force effectiveness in the next QDR. These models do not do IO well. Several of them address it in a cursory manner, or attempt to answer IO questions via analyst workarounds; the models were designed to focus elsewhere.

Good information is being developed via exercises, and actual operations, but this tends to be anecdotal, or “single data point” in nature.

The subgroup reviewed models that used influence mapping and effects based concepts. The group strongly believes these types of tools are required to properly analyze IO. The models presented have been developed to their present maturity with significant “operator” input and guidance, and clearly can contribute to the upcoming QDR analysis. As noted, integration with conventional models to create a model of the entire battle space remains a challenge.

JWARS availability remains a significant risk area for this QDR. It will provide a significant step forward in understanding some areas relevant to IO.

The bottom line is that IO analysis can not depend on model-based approaches, and will require more “old fashioned” structured qualitative (“thought-based”) assessments, based upon experts’ inputs. We must ensure decision makers are prepared for this type of product.



Information Operations – Data (1 of 2)

- Volumes of data available
 - Hard to extract what we need
 - Not everything we want available, e.g.
 - Specific decisions by specific individuals unknowable
 - Parameters for analysis tools/methods
- No coordinated collection plan

There are significant data “out there.” Most, however, are empirical, one-time or qualitative in nature. I have already alluded to the expected difficulties in separating data relevant to specific IO questions from the entirety of exercise or campaign model runs.

The IO community needs to establish coordinated requirements and plans for collecting data to support analysis. The JDS presentations testify to the difficulty of this undertaking, but also highlights the potential for improvement — given sound guidance and leadership.

Also listed are a few of the sources for IO data.

Another data-related problem (no solution proposed) is the high-level security classifications in some IO areas, as well as legal and bureaucratic concerns in areas outside traditional military warfare arenas.



Information Operations – Data (2 of 2)

- Sources, Collectors
 - CINCs engagement analyses (e.g. Joint Forces Command J9)
 - NSA -- INFOSEC and OPSEC
 - DIA
 - DISA
 - JIOC (aka JC2WC)
 - JWC
 - DMSO
 - Service Information Warfare Centers(AFWIC, LIWA/IDC,FIWC)
 - Joint Battle Center (Suffolk, VA)
 - Service Research Labs
- Security / Legal / Law Enforcement Issues



Existing/On-Going Efforts

- Naval Postgraduate School SIAM model (with PACOM)
- JWAC
- CINCs
- J-6 Analysis
- Information Superiority Investment Strategy (ISIS) (ASD(C3I))
- Bosnia/Kosovo Lessons Learned
- OOTW operations include IO, thus data issues are very similar
- Others?

This is a listing of known efforts that focus on the IO area. There are many other efforts for which at least some treatment of IO issues will be a by-product. This, again, illustrates the inherent difficulties in separating IO analysis from that of the traditional warfare areas.

IO is not addressed in Dynamic Commitment (DC). DC is a force structure analysis. This highlights a concern. IO is not about force structure or acquiring platforms or systems. Right or not, realistically much QDR analysis and debate will, however, fall along these lines.



Significant Analytical Issues Surfaced

- IO extends beyond DoD
 - Legal implications/ramifications
 - Coordination with other government agencies -- ROEs
- Area not well defined (similar to OOTW)
- Lack good measures
- Inadequate and uncoordinated data support
- Some data will never exist -- subjective
- Difficulty in defining and analyzing interaction of combined IW/IO and conventional forces
- Network Centric Warfare and effects-based operations difficult to analyze

Most of these items have already been discussed, but they clearly are significant issues regarding analysis supporting the QDR.

It is difficult to define good measures of effectiveness for many IO areas.



Key Deficiencies

- Methodology
- Metrics
- Models
- Data
- Costing

This chart lists areas with key deficiencies in the analysis of IO.

We did add Costing. This is a significant risk area in IO analysis. The qualitative nature of analysis will dictate problems in assessing cost effectiveness and building business cases for IO capabilities. Though there is clear agreement that IO is necessary, weighing costs versus benefits is problematic, to say the least. Putting a value on avoiding the costs of a computer network attack (cost avoidance) is similar to the problems faced in determining return on investment in many other areas relevant to DoD, particularly acquisition. Decision makers must be prepared to accept qualitative judgments in IO analysis.



Suggested Analytical Improvements

- For QDR 2001 preparation
 - Incorporate IO (as defined in Joint Pub 3-13 *Joint Doctrine for Information Operations*) into COAs
 - Develop coordinated data collection and sharing
 - Incorporate subjective analysis tools and methods
- For future Joint analysis in the 21st century
 - Partner with joint and service doctrine commands and others
 - Ensure joint and service models incorporate IO, to include data support and measures
 - Include IO in joint and service experimentation

This chart lists the recommendations of the IO subgroup. Obviously, many other details mentioned in the previous slides may be taken by working level analysts as suggestions for improved QDR analysis.

To summarize the consensus of the IO Sub-Group's discussions:

(1) The importance of IO is appreciated in most of DoD. Aspects of IO impact everything we (DoD) do in the scenarios being considered, as well as some developing scenarios of potential interest. It does not, however, fit the DoD construct of warfare areas. IO extends beyond many traditional DoD areas of responsibility. Also, it is not force structure, per se. Thus, IO is hard.

(2) Our present models and analysis tools do not adequately represent IO. Much of the analysis required for the QDR will be qualitative in nature. Decision makers must be prepared for this type of result.

(3) Exercises and research addressing IO show promise and deserve continued support. A goal of the QDR analysis should be to develop the more specific recommendations necessary to continue moving forward in the IO arena.



Asymmetric Challenges Subgroup

Chair: LTC Jerry Glasow
Co-Chair: LTC Bruce Bowman

3 February 2000

This is the outbrief for the Asymmetric Challenges Sub-Group under the Respond Working Group during the Joint Analysis: QDR 2001 and Beyond Mini-Symposium.

LTC Glasow Chaired the sub-group and LTC Bowman was Co-Chair.



Working Group Members

- COL Bruce Palmatier, Army PA&E
- Jeff Grotte, IDA
- Gary Paul, CAA
- Larry Willis, DARPA
- Tom Allen, IDA
- Jim Davidson, MCCDC
- Craig Reichow, Anser
- MAJ James Hammett, USAF/XONP
- Jim Velezis, BAH
- Kevin Murray, BAH
- C. Parks Schaefer, GRCI
- Pat Cooper, BAH
- Joan Wendland, BAH
- MAJ Michael McCaffery, Army PAE
- Robert Osipov, OSD/PA&E
- Leroy Abner, USASOC

These were the sub-group participants. The sub-group had good participation in numbers, a good cross section of DoD, and lively discussions.



Sub-Group Agenda

1 February: Symposium Level Plenary Sessions

2 February: Respond Working Group Plenary Sessions on Theater Modeling

3 February:

0800-0900

LTC Rick Reece, 1999 Joint Strategy Review: Asymmetric Approaches to Warfare

0900-1000

Dr. Jeffrey Grotte, Analysis of Issues Pertaining to WMD and the QDR

1000-1100

Larry Willis, Wargaming the Asymmetric Environment

1100-1200

Discussions and Conclusions Formulation

1430-1700

Outbrief (~15 min) in Working/Sub-Group order, exact time TBD

The sub-group met in plenary with all Respond sub-groups during Day 2, leaving only one-half of the last day to meet as a sub-group.

LTC Reece of J5 provided a classified briefing on the Chairman's 1999 Joint Strategy Review (JSR) which focused specifically on asymmetric challenges. The sub-group accepted this document as the basis for defining asymmetric warfare and the approved joint strategy related thereto.

Dr. Grotte, of the Institute for Defense Analyses, provided a classified briefing on an OSD(S&TR) study chartered specifically for the "Analysis of Issues Pertaining to WMD and the QDR." This study is reviewing the input data and data sources from recent WMD studies. The intent of this study is to provide data inputs and/or resolve data controversies for the upcoming QDR.

Mr. Willis, of DARPA, provided a briefing on a recently started, long term (five year) study to build a model for predicting who might employ asymmetric weapons. This effort has many similarities with personality profiling by a criminal psychologist.



Scope/Analytical Subject Areas

- Definition: Asymmetric approaches are attempts to circumvent or undermine US strengths while exploiting US weaknesses using methods that differ significantly from the United States' expected method of operations.
- Asymmetric approaches:
 - WMD
 - Information Operations (IO)
 - Terrorism
 - Missiles
 - Mines
 - Hybrid Tech
 - Mass
 - Political manipulation
 - Environment
 - Other

The 1999 Joint Strategy Review (JSR) defined and listed asymmetric approaches as shown here.

A key finding in the Joint Strategy Review was that there is nothing new about asymmetric warfare. What is new is the realization on the part of potential opponents that going head-to-head with US military power is a recipe for failure. This forces potential opponents to devise asymmetric means.

The sub-group strongly recommends that everyone conducting QDR analysis read the 1999 Joint Strategy Review.



Existing/On-Going Analyses

- WMD: Multiple related studies
 - IDA
 - DTRA
 - UK/US
 - AMC
 - DARPA
- Non-WMD: None identified

The sub-group members had knowledge of multiple and varied existing and on-going studies associated with WMD; too many to list here.

On the other hand, the sub-group members had no knowledge of any studies specifically considering non-WMD asymmetric warfare.

During the sub-group out-brief at the end of the mini-symposium, a Navy representative indicated they had performed one such study.



Key Deficiencies

- Non-WMD
 - Little non-WMD asymmetric analytical methodologies/metrics
 - Lack of ability to model non-physics phenomenon.
- WMD
 - Lack of agreement on some WMD methodology/metrics/data
 - High resolution installation level models?
 - Aggregation of performance degradation data
 - Effects (traditional, toxic industrial chemicals, novel agents)
 - Little structured data quality/collection efforts
 - JWARS capability/limitations for QDR?
 - Acceptable substitute models?

These are the key deficiencies noted by the sub-group.

The Non-WMD area is suffering from the lack of an organized comprehensive effort to identify vulnerabilities, assess the impacts of attacks on those vulnerabilities, and integrate the impacts of those attacks into a theater campaign.

On the other hand, much work has been conducted on WMD vulnerabilities, but there is significant disagreement on the impact chemical and biological weapons will have on aggregated unit/facility/base performance. JWARS remains an open question with regard to chemical and biological representation. While the capability is advertised as one that will be available for the QDR, there is concern about links and data to support the interaction of chemical and biological hazards in JWARS.



Suggested Analytical Improvements

- For QDR 2001 preparation
 - Common basis: 1999 JSR: Asymmetric approaches to warfare
 - Mainstream QDR efforts need to fold in JSR asymmetric aspects.
 - Include specific asymmetric events in Dynamic Commitment (DC)
 - Asymmetric experiment (near term low hanging fruit)
 - Red team specific vulnerabilities (LD/HD, AWACS, HNS, "Red Line")
 - Assess impacts and mitigation measures
 - Literature search past studies (sparse)
 - JDS oriented group for QDR standardized CB data (methodology/doctrine/policy)
- For future Joint analysis in 21st Century
 - MORS Working Group for MORSS
 - Institutionalize experimentation
 - Asymmetric mini-symposium

We need to ensure the 1999 Joint Strategy Review forms the basis by which asymmetric approaches to warfare are included in the upcoming QDR.

We should include specific asymmetric events in Dynamic Commitment (DC).

We need an experiment or POL-MIL game to Red Team specific asymmetric vulnerabilities and likely attacks as well as to assess the impacts of those attacks with and without mitigation measures.

We need to update JDS WMD data.

We should consider future methods to institutionalize the analysis of asymmetric warfare, to include possibly a working group for the MORS Symposium, a series of warfighting experiments, and/or an asymmetric mini-symposium.



Readiness Subgroup

Chair: Laura Junor

3 February 2000

The readiness subgroup met from 0800 to 1200 on 3 February. This briefing outlines the highlights of our discussion.



Working Group Members

- Julianne Allison, US Center for Army Analysis
- Joseph Angello, Jr., ODUSD(R)RP&A
- Roger Burley, Logicon at OSD PA&E (SAC)
- Louis Finch, STR Corporation
- James Jondrow, CNA Corporation
- Laura Junor, CNA Corporation
- James Metzger, OSD (PA&E) JWARS
- Allen Miller, US Army War College
- COL Forrest Newton, DAMO-ODR
- Michael Parmentier, ODUSD (Readiness)
- David Thaler, RAND

Eleven people registered for the subgroup but about 17 in attended. We had representation from each Service and the Joint Staff (JS). We were also fortunate to have Joe Angello and Lou Finch (former DUSD, Readiness) who supported the last Quadrennial Defense Review (QDR) process.



Analytical Subject Areas

- Strategy drives resource allocation
 - Readiness measures resources against strategy
- Quantifying the effect of changes in drivers
 - Aging equipment
 - Spares
 - Personnel issues
 - PERSTEMPO/OPTEMPO
 - Alternative training concepts
 - Infrastructure/Industrial base (competitive sourcing)
- Quantifying pros and cons of competing readiness postures

Three themes dominated our discussion. The first was the unanimous agreement that readiness cannot be analyzed in a vacuum. At the least, readiness should be measured against a given strategy. The readiness of the forces to fight two simultaneous Major Theater Wars (MTWs), two consecutive MTWs or an MTW and a Small-Scale Contingency (SSC) will vary widely. Readiness will also depend on force structure, infrastructure and personnel decisions. If these areas are not analyzed as part of a system, the results are not likely to be sustainable.

The last two themes have to do with managing readiness. One aspect of management has to do with understanding the relationship between drivers and measures of readiness. With this type of information, the military can more easily determine the cause of declines in readiness and the remediation options.

The other aspect of management, perhaps the more difficult of the two, is to determine how much readiness is enough. There is simply not enough money or resources to maximize readiness for all units all of the time and to finance planned modernization and recapitalization. The last QDR asked what different readiness postures (always ready, tiered readiness, cyclical readiness, etc.) implied in terms of the supply and demand for ready forces. The analysis at that point was a good start, but the group agreed that this type of question is likely to come up again and that the analysis could be improved.

Analysis Approaches and MOEs

- Measures
 - Readiness
 - SORTS (commander's assessment, reason codes)
 - MC/FMC rates
 - Equipment casualty reports
 - Duration measures (logistics, maintenance)
 - Personnel data
 - Cost
 - O&M expenditures
 - Manpower
 - Procurement
- Approaches
 - Understanding changes in readiness
 - Calculating supply and demand of forces

There are measures of readiness and measures of things that drive readiness. The standard readiness measures are familiar to most. The most important of these is the Status of Resources and Training System (SORTS). SORTS has its critics, but it is the one metric that each Service uses to depict readiness. The group reminded us that there is more information in SORTS data than we see in the overall — or even the resource area — ratings. For example, there are commanders' assessments with notations in the data that tell when a commander has upgraded or downgraded their scores and reason codes that tell why a unit was less than C1 in a given resource area. Equipment availability rates are also a standard measure of readiness. The most common are Mission Capable (MC) and Fully Mission Capable (FMC) rates for aviation and ship casualty reports (CASREPS). Duration measures make excellent measures of supply readiness. The best of these measures track the time that an operator waits for a spare part. There is an important distinction between this type of metric and one that measures, for example, wholesale shelf fill rates. A good readiness metric shows the direct impact on the operator. Shelf fill rates provide little readiness information. Duration measures (such as time to complete maintenance) also make good measures of readiness drivers. The last category of readiness measures comes from the personnel databases. These data can directly measure the number of bodies relative to requirements and the quality of the match between bodies and billets (accounting for experience and qualifications).

There are two general approaches to analyzing readiness: 1) understanding readiness changes; and, 2) calculating the supply and demand of forces. Understanding readiness means monitoring readiness in a way that signals changes that require intervention. The inherent noisiness of readiness data makes monitoring hard. Understanding readiness also means understanding what is causing recent degradations and creating remediation strategies. Calculating the supply and demand of forces is a necessary part of evaluating the readiness consequences of changes in strategy, force structure or competing readiness postures.



Existing/On-Going Analyses

- Monitoring readiness
 - SROC, JMRR, QRRC, many service programs
- Understanding changes in readiness
 - Substantial literature
- Calculating supply and demand for forces
 - Work from last QDR (Dynamic Commitment (DC))

Readiness, especially in the last five years, has been the subject of many analyses, conferences and high-level forums. Examples of standing high-level forums that monitor current readiness status include the Senior Readiness Oversight Council (SROC), the Joint Monthly Readiness Review (JMRR) and the Quarterly Readiness Report to Congress (QRRC). There are other service-specific examples. A number of analyses have empirically derived relationships between readiness drivers (like spares on-hand, operations tempo and personnel) and readiness measures (like SORTS). The Federally Funded Research and Development Centers (FFRDCs), such as CNA, RAND and IDA, and the military post graduate schools are good sources for such research.

Little has been done to calculate the supply and demand of forces except for the work done during the last QDR. That said, Dynamic Commitment (DC) provides useful information on the demand for ready forces under specific assumptions, and that model has been significantly improved in the last few years.



Significant Analytical Issues Surfaced

- Articulating and understanding competing readiness postures
- Articulating the amount of readiness (including measures and roles) for full spectrum response under various conditions
 - MTW
 - SSC
 - Homeland defense

The prevailing theme in the readiness subgroup was that there are not enough resources to ensure that all units are ready for any type of mission all of the time and to invest in tomorrow's force structure as well. Given this imbalance between ends and means, readiness-related QDR issues are likely to ask how much readiness is required and whether there is a better way to ensure that national security concerns can be addressed with the resources we have on hand.

That brings up two analytical issues: 1) how to analyze alternative readiness postures; and, 2) how to measure the amount of readiness we have given the range of operational employments and conditions we may encounter in the future. We addressed the supply and demand issue earlier in the brief. Aside from the efforts in the last QDR, little has been done to directly analyze this issue. This is difficult analysis even with a correctly specified model in place. The analysis is extremely dependent on the starting assumptions of strategy (two simultaneous MTWs, two consecutive MTWs, one MTW and one SSC, etc), available force structure, and a variety of operational assumptions. And to offer a complete answer, we must be able to replicate the analysis using a variety of assumptions.

The second analytical issue addresses the complexities of assessing the amount of readiness desired for a full spectrum response. DoD is used to thinking about its requirements for an MTW, and in fact this is built into many readiness metrics (SORTS, for example). DoD is not as experienced in articulating readiness measures or requirements for SSCs, but there has been progress. However, little thinking has been done on measuring the readiness for homeland defense or even our readiness to fight MTWs or SSCs given the complexities of varying conditions (like the use of chemical or biological weapons).



Key Deficiencies

- Metrics
 - *On direct measures*: Incomplete coverage of infrastructure and training
 - *On drivers*: Often not customer (warfighter) based
- Models
 - There is not a readiness model
 - Need a model that will produce output quickly
- Data
 - Budget data aren't organized in any useful way
 - Failure to archive and consider importance of historical data
 - Failure to take advantage of advances in database technology
 - Failure to take advantage of web-based technology

The largest deficiency for readiness measures is for infrastructure (measuring the ability of the infrastructure to support the warfighter) and unit training (other than SORTS). The services are working on better measures of the first, and there is hope that they will yield useful information soon. The training accomplishment of a given unit is something that is theoretically addressed in the training resource area within SORTS. Often this amounts to translating the percentage of events a unit successfully completed (given the number it was required to perform) into scores for each mission area. Mission area scores are then translated into an overall training score (typically using the worst or second worst mission area score). It would be far more informative (and useful for analysis) if the actual percentages were retained and archived. The main deficiency for drivers is that they are often not measured from the perspective of the warfighter and that is the primary (if not the only) perspective relevant for readiness. Logistics measures, for example, should measure the amount of time the operator is waiting for a spare part. Any other measure is secondary at best.

Several analyses have related measures to drivers, but there is no standard model for calculating the supply and demand for ready forces outside of the effort from the last QDR. Such a model should be capable of being run quickly to explore the consequences of a variety of initial assumptions (strategy, force structure, environment, etc.).

Data is the last category of deficiency. Our first observation is that budget data aren't organized in a way that allows analysts to easily match money to readiness deficiencies. The remaining items highlight data deficiencies that generally arise from a failure to take advantage of incredible advances in database technology. Archiving historical data, for example, is easy to do and relatively inexpensive.



Suggested Analytical Improvements

- For QDR 2001 preparation
 - Continued database development for PERSTEMPO
 - Continued monitoring by readiness analysts of other QDR activities
 - Continued improvements in Dynamic Commitment
- For future joint analysis in 21st Century
 - Development of readiness models for use in comparing readiness postures

Our suggestions for QDR 2001 preparations are in line with what the department is already doing. Continuing the development of PERSonnel TEMPO (PERSTEMPO) measures will help identify the magnitude of OPERations TEMPO (OPTEMPO) problems. The group stressed that the readiness team (if one is established) should remain closely tied to the activity in other QDR cells (such as force structure and infrastructure). The idea, again, is that readiness analysis cannot be done in isolation and the only guarantee of a viable result is to remain aware of decisions and assumptions in other dimensions. The group supported the continuing development of the Dynamic Commitment (DC) model which would provide valuable input into readiness analysis.

The group felt that a complete readiness model was not likely to be developed in time for this QDR, but encouraged its development in the early 2000s.

**MORS Mini-Symposium
Joint Analysis: QDR 2001 and Beyond
Prepare Working Group**

Chair: Dr. Jackie Henningsen, FS

Co-Chair: Mr. Vern Bettencourt, FS

Service Advisor: DCS OPS

The Prepare Working Group had two sub-groups; Modernization chaired by Mr. Eric Coulter, OSD/PA&E and Infrastructure chaired by Mr. Sam Kleinmann of the Center for Naval Analysis. Before they provide a summary of the work of their individual groups, I would like to comment on a couple of themes in the area of *Prepare* (implied when not explicitly stated) that have emerged since the MORS special meeting on *QDR Lessons Learned and the Way Ahead in 1998*.

There seems to be an understood need for a joint capabilities baseline linked to the transformation planning process. This baseline, whether virtual or real, would encourage the examination of QDR decisions based on what is needed to achieve the visions first set out in JV2010 and now echoed in JV2015 and beyond. Development of a joint capability requirements baseline involves a conscious collaborative effort among the strategic planners, the operational experts and the analysts (to include program, cost, infrastructure and various other types).

Finding ways to increase the likelihood that all the effort involved in preparing for and executing studies, reviews, panel work and the multiple aspects of the QDR was a somewhat different, but interesting theme. Lou Finch, former Deputy Under Secretary of Defense for Readiness had an interesting recommendation as we work to accomplish these efforts. He suggested that we look carefully at the feedback loops that are in place to see whether there is a mechanism to influence change in place. This suggestion should lead us to go back to our organizations and examine how we structure feedback loops in our modernization and the infrastructure processes.

Prepare Working Group

Modernization Subgroup

Chair: Eric Coulter

Infrastructure Subgroup

Chair: Sam Kleinmann

Another theme was the recognition that constrained planning is at the heart of what we do, so it becomes critical that we more broadly define our resources. One of the briefer suggested that we would still do analysis the same way if we start with strategy or if we start with budget. This returns us to Vince Roske's theme for beginning an analysis that starts: What is the question? What is the real question? The idea that the analysis would not change seemed problematic to me (a dialogue on this topic using the MORS web-site based Joint Senior Advisory Group reflector is encouraged).

A third theme that was evident in the prepare sessions revolved around the nature of risk. The QDR guidance from Congress specifically directs an examination of a Force Structure providing a low to moderate level of risk. Inherent in our discussions of what we do and don't choose to support must be the effects of these choices. Frustration with the current methods of examining risk led us to call for a near-term MORS symposium on innovative methods for dealing with risk.

Finally, the interest in how to effectively perform Joint Collaborative Analysis (JCA) was continuously mentioned during this special meeting. A plan to examine this question during the upcoming meeting on the *Future of DoD Analysis* is in planning. The benefits of JCA, and the challenges of turning theoretical operations research techniques into practical applications for the QDR is worth our community consideration.

With these opening remarks, I turn the rest of the Prepare Working Group over to Eric and Sam would each prepared and led outstanding sessions focused on the exploration of two key Prepare issue areas.



Working Group Members

Briefers

Steve Brevig, OSD PA&E
Phil Walsh, IDA
Mike Moore, Army

CDR John Purnell, Navy
LtCol Tim Lindemann, Air Force
Col Scott Leitch, Marine Corps

Panel Participants

Craig Bernhard, Boeing
Maj David Davies, Air Combat Command
James Hinch, Computing Technologies,
Inc.
Robert Holz, Army ODCSPER
Steven Kratzmeier, Army Material
Systems Analysis Activity

Maj James McMullin, Army
Concepts Analysis Agency
Israel Nussbaum, US
Transportation Command
Phil Rogers, OSD AT&L
Mary Scala, OSD PA&E
CAPT Charles Wilson, Navy N81
Maj Joe Shrader, MCCDC



Scope

- How analysis may help in the modernization and force size decision.
- Determining the effectiveness of new operational concepts.
- Drawing lessons from Joint and Service “advanced warfighting experiments.”
- Incorporating advanced technologies into modernization planning.

We defined the scope of the two working sessions of the force modernization subgroup according to the mini-symposium terms of reference (bullets 1-3), with particular emphasis on how planners intend to adapt to emerging, advanced technologies (bullet 4).

Day 2: Representatives from the Army, Navy, Air Force and Marine Corps described the analytic methods, operational concepts, experiments and technologies which were influencing how they shaped their future modernization. IDA presented a desktop modeling technique optimizing the application of existing or new C4ISR technologies.

Day 3: OSD PA&E described the methodology for constructing an annual Defense Program Projection (DPP) from historical and projected program data. The DPP is used by Pentagon decision makers to extend the planning horizon for modernization and related investments 12 years beyond the current FYDP to examine the long term consequences of current decisions. It projects key large modernization programs (F-22, CVN-X) and selected support accounts (BRAC, medical). The resource topline is an output from, not an input to, the DPP. Thus, it is a good tool for identifying where near-term decisions may raise outyear affordability questions.



Modernization Drivers

- Strategy
 - Force application
 - Mission requirements/capabilities
 - New service/joint CONOPS/visions
- Threat
 - Uncertainty (MTW vs SSC vs Near Peer)
 - Asymmetrical
- Aging platforms
 - Aircraft, ships reaching end of useful life
 - Replacement systems more capable, offer trade-offs
 - Reduce O&S (manning, support)
- *Because we should....*
 - Available technology
 - Industrial base

We modernize for four main reasons:

(1) Strategy changes: New military missions (e.g., prepositioning for rapid force projection), new capabilities (e.g., precision munitions, non-lethal weapons), or new operational doctrine (e.g., coercive campaigns) usually demand a change in investment priorities — especially when such change is pursued through formal service or joint transformation plans/vision which redefine and remix the NCA's options for applying force.

(2) Threat changes: We invest to counter our opponents technology and tactics. However, the post-Cold War threat environment remains problematic. We still plan and invest for large wars, yet near- and mid-term threats appear to be mainly asymmetric: numerous smaller, intense conflicts of short duration, or catastrophic terrorism on US soil employing Weapons of Mass Destruction (WMD).

(3) Aging Platforms: Perhaps the largest portion of our investment accounts go to replace old systems — old in both calendar and technological terms. The challenge is to leverage leap-ahead technologies to replace old systems with ones that dramatically enhance combat effectiveness, yet require fewer resources (manpower and sustainment) to operate and maintain.

(4) Because we should: When the technology is better, when we need to buy more to preserve a unique capability in the industrial base, we must invest to ensure we stay ahead of competitors.



Modernization Dilemma

- Full-spectrum force perspective
 - Crisis involvement worldwide likely (high frequency)
 - OPTEMPO and PERSTEMPO remain high
 - Current mod plans optimized for MTW
- O&M accounts are stretched
 - Lack of spare parts, low mission-capable rates
 - Pay and other personnel accounts (e.g., health care) must compete with booming economy to draw and keep good people
- SLEP or new? Tactics or technology? Leverage joint capabilities?
- Synchronization with allies, coalition partners
- Affordability

Our current modernization plans remain optimized for large wars, yet the security forecast seems to be for continued, multiple response missions to frequent crises world wide — with all the attendant problems of equipment strain, re-supply and personnel tempo. Even as we contemplate what technological investments are needed to “transform” the “tooth” of the force, we face persistent, fast-growing shortfalls in our sustainment accounts (weakened by the frequency of humanitarian and small war operations), and the need to significantly bolster pay and quality-of-life investments (as an incentive to recruit and retain quality personnel).

Thus, we need to understand what is *effective* modernization? Old systems do not necessarily mean incapable systems: Service Life Extension Programs (SLEP) can make an old aircraft “young,” and may be a better choice than a new major system purchase. In some cases, fighting smarter — with more flexible, adaptable force structures — may bring better combat effectiveness than new technology. And do we know when the technological gap between how US forces and our coalitions partners fight ceases to be an advantage and becomes a vulnerability?

How we answer these questions *in combination* is our modernization dilemma. Our choices will determine how much change we can afford, and how well our investment choices will translate into operational effectiveness on the battlefield.



Analysis Challenges

- Demonstrate the military worth of mod initiatives
 - Avoid optimizing for narrow set of conditions
 - Quantify value/impact of new capabilities (lack of data)
- Adapt analysis tools/data to reflect new technologies, systems, capabilities (organizational)
- Identify and assess trades among functional areas
 - Platforms vs. munitions
 - Sensors vs. shooters
 - System-of-systems vs. discrete technologies
 - Above-the-line vs. below-the-line forces
- Identify framework constraints (scope, data)
- Lack of agreement on current and future system performance

Given the timelines we face for the QDR, it is unlikely we will be able to employ the large theater-level models (CEM, TACWAR, THUNDER), since all impose onerous preprocessing penalties. COSAGE boards take 6 months or more to assemble — even if the data were available. For example, the most recent mobility study (MRS-05) took 2 years to complete; much of that time was spent achieving consensus on study assumptions and data configuration.

But perhaps more constraining, because large campaign models are optimized for examining large wars within a narrow set of assumptions, they are inflexible tools ill-suited for examining some of the more interesting issues for QDR 2001 which are emerging from operational lessons and transformation proposals. It may be that other tools, such as JICM, may be better suited for attacking the smaller questions which may be the key analysis nodes for this coming QDR.

But this does not mean analysis — or the big models — do not have a role in the QDR. Instead, we must focus our efforts carefully on the most pertinent, important issues; we must identify specific areas to examine, then we must apply our existing tools carefully — to include the big models.



Analysis Challenges (Cont.)

- Demonstrate the military worth of mod initiatives
 - Avoid optimizing for narrow set of conditions
 - Quantify value/impact of new capabilities (lack of data)
- Adapt analysis tools/data to reflect new technologies, systems, capabilities (organizational)
- Identify and assess trades among functional areas
 - Platforms vs. munitions
 - Sensors vs. shooters
 - System-of-systems vs. discrete technologies
 - Above-the-line vs. below-the-line forces
- Identify framework constraints (scope, data)
- Lack of agreement on current and future system performance

By using smaller optimization models and other quick-turnaround techniques, we bore in on key issues which need to be addressed by the QDR 2001 analysis campaign plan.

For example, facing a smaller war in Africa, we know if we get to the fight we will win — but how is the timeliness of our response and the risk to a speedy termination to the conflict compromised by our limited ability to deploy to and through an immature theater? Or given a more conventional large-war scenario, do more *sensors* buy more combat power than more *shooters*? Do too many (or too few or the wrong kind) below-the-line forces limit operational effectiveness under quick-response crisis conditions?

Within this context, JWARS may prove to be a useful resource, even though it may not be fully ready to take over from the legacy systems within the QDR timeframe. For example, JWARS can look at C4ISR questions better than current tools (again, the sensor vs. shooters question). JWARS can also undertake assessments the legacy tools cannot, especially logistics effects and intra-/inter-theater lift demands, which can be used to inform other model or analysis results.

Finally, we need to work in a focused and deliberate manner to begin to arrive at some consensus on how to characterize the *combat performance* of current and future systems.



Analytical Tools

- Last QDR recognized the need for better analytical models and simulations
 - Lot of work and money expended on JWARS, JMASS and JSIMS — but development and test timelines problematic
 - SSC-focused tools have been developed
- Legacy models will still be needed for next QDR
- Optimization models and other quick-running tools will be useful
- Limited data available for models
 - Canonical MTWs and SSCs
 - Preprocessing times

We will need the legacy systems for the next QDR. However, the time needed to process data for the big war fight models — and the very limited availability of data for just the new issues our group identified as key to useful analysis — means we must use the legacy models in smarter, more limited ways.

As an example, we could begin by examining the currently listed, but mainly ignored, excursions to the existing “canonical” large-war scenarios to identify if they offer opportunities for better exploring the full-spectrum modernization dilemma we highlighted earlier.

By rolling up our sleeves and being creative, we can find ways to use the larger models to do useful, limited analysis of key warfight enablers, and disablers.



General Recommendations

- Agree on scope of analysis (*bound the questions*)
 - Develop analysis “campaign plan”
 - Identify which MOEs should be used
 - Determine which/whether models will be used
 - Identify scenarios
 - Update/develop databases
- Identify key Essential Elements of Analysis (EEA)
 - Access/deployment
 - Engagement sequence/sustainment
 - Force mix/unique operating capabilities
- Develop support tools to:
 - Capture the results of all major studies done since last QDR (MRS-05, DAS, AOAs, JWCA, AWEs, Kosovo Lessons Learned)
 - Track the status of directed joint programs, transformation activities

The issues highlighted in the previous slides can be summarized into a design for an “analysis campaign.” Decide what the question is, settle on EEA, and cast around for simple, accessible support tools to keep the decision-makers on track throughout what is likely to become a confusing and frenetic process.

We think it especially useful to establish a baseline of existing expert knowledge — to make accessible all the key and recent analysis, so we can bring that information to bear to frame our choices in what models to use for the QDR, and what MOEs and EEAs should be given priority in decisions.



Suggested Analytical Improvements

- Develop a modernization taxonomy based on components' transformation commitments
 - Include below the line forces (e.g., promise of Focused Logistics)
- Rely on scoping analysis to limit the number of modernization alternatives (consider both capability and affordability)
 - LP, spreadsheet models
 - Leverage current and ongoing analysis
- Use long-range planning tools (e.g., DPP) to identify key modernization drivers for transformation (e.g., affordability, timing, range of capabilities)
- Assess military worth of key alternatives
 - Assess robustness across wide range of scenarios
 - Limit analysis to answer specific question
 - Lack of data and limited analytical resources require use of other tools/techniques

We should begin preparations for the QDR carefully identifying and defining in common terms key capabilities that will be retained or developed as part of service transformation activities. We need to understand how new force structures or mix (e.g., the new fast-deploying Army combat brigade) and new technologies or modes of operation (e.g., focused logistics) will re-baseline the core competencies of the services, and the menu of military capabilities available to the NCA.

After we understand these key changes, we should use fast, “quick-thinking” models and techniques (e.g., linear programming) to focus on those modernization initiatives -- major systems or enabling technologies -- which will leverage transformation activities. We could also use the DPP to identify what are the key modernization drivers for transformation over the long term (e.g., aircraft or C4ISR investment). A DPP-like analysis can also test the timing and affordability of independent transformation activities among the services and the defense agencies, and suggest where choices may have to be made, or how adjustments to out-year plans can leverage among different organizations' development programs.

But most important, we need to use these next few months to develop agreed upon means to assess the worth of change -- after we focus on the “right” questions, we need to develop the data and right analytic tools to test the relative *robustness* of new capabilities across a range of scenarios, representing the full spectrum of conflict, and thus the comparative *military utility* of competing modernization visions.



Infrastructure Subgroup

Chair: Sam Kleinman

Co-Chair: Frank Camm

3 February 2000

Many studies question the efficiency of the infrastructure. Common charges are that there is excess capacity, duplicative services, non-value services, dated technology and poor use of people. This has led to major efforts to cut costs and shift resources to new procurements. These efforts include base closures, wider use of the private sector, consolidations of organizations and revisions to the acquisition process. Most empirical work confirms the value of these efforts, yet the savings do not appear to be of the magnitude anticipated.

The services that the infrastructure provides enhances the readiness of our forces. Although overall readiness remains high by historical standards, it has declined in some areas. The modeling challenge is to better capture the impact of infrastructure services on both costs and readiness. Cost reductions are designed to cut resources without reducing readiness. In fact, we cannot claim that a savings improves efficiency if it also lowers readiness. We may be willing to accept less readiness, just as we have accepted smaller forces, but that saving is not an efficiency in the strictest use of that term.



Infrastructure Subgroup Members

- Glenn Ackerman, CNA
- Dan Barker, Air Force, AFSAA/SAQ
- Jeff Bennett, LMI
- Richard Berg, Army, SMDC-BL-SS
- Greg Brewer, DoA, OACS (Installation management)
- Frank Camm, RAND
- Bill Chiaremonte, GRCI
- Dan Cuda, IDA
- Carl Dahlman, RAND
- LCDR Mark Deibert, Navy, N81
- Capt Pete Eltringham, USN, OJCS(J4)
- Mac Fairchild, ACS Defense
- Col Ryan Ferrell, USAF, AF/ILX
- Lou Finch, STR Corp
- Sam Kleinman, CNA
- CPT Doug Matty, Army, USMA
- Jeff McManus, JPO-STC
- Ron Nickel, CNA
- T.J. O'Malley, LMI
- Eric Peltz, RAND
- Maj Greg Rau, Air Force, USTRANSCOM
- Maj Curt Rogers, USMC, MCCDC
- Carla Tighe, OSD(PA&E)
- Jack Ward, JDS/JWARS

Here are the members of the infrastructure subgroup. They represented all the Services, JCS, OSD, analytical organizations and private support organizations. The group included individuals who examined infrastructure in the last QDR.



Scope (1 of 2)

- Addressed the broad infrastructure
 - Generally nondeployable activities
 - But also examined support in forces
 - “Derived demand”
- Emphasized the support processes provided by infrastructure
 - Materiel support, personnel support, facility management
- Infrastructure/force dichotomy is often arbitrary and obscures trade-offs
- Had to consider potential issues before we could discuss analytical contributions

The military's infrastructure consists of those resources, facilities and organizations that don't deploy during operations.

The working group focused on the processes performed by the activities in the infrastructure. We examined the processes in three areas: materiel support, personnel support and facility management. To address efficiency and performance in the use of resources, we need to understand the processes by which we decide how to use them. It is these processes that determine how much we spend and how much value we get out of the infrastructure. We need to understand where processes break down, or fall short, in providing value to the military, and we need to evaluate the processes in the context of both warfare metrics (readiness, delivery of ordnance and troops, flexibility, surge) and efficiency. The components to the processes are surprisingly similar across the different types of support services: the setting of requirements, acquisition of resources, making best uses of the available resources, maintaining the productive value of those resources, separating resources and replacing them. In fact, facilities, materiel and personnel are each managed as life-cycle processes with comparable phases.



Scope (2 of 2)

- Addressed the broad infrastructure
 - Generally nondeployable activities
 - But also examined support in forces
 - “Derived demand”
- Emphasized the support processes provided by infrastructure
 - Materiel support, personnel support, facility management
- Infrastructure/force dichotomy is often arbitrary and obscures trade-offs
- Had to consider potential issues before we could discuss analytical contributions

We believe that the division between infrastructure and force structure is often arbitrary and can lead to poor management and analytical models. Many of the potential trade-offs are between components of the forces and components of the infrastructure. For example, technology may allow shifting support from inside the forces to a base back in CONUS. This could reduce lift requirements, make the forces more responsive and flexible, and reduce overall costs. Yet, it could also increase the size of the infrastructure and the ratio of infrastructure costs to force levels. We must recognize these types of trade-offs and not allow our infrastructure classification to mislead us in evaluating alternatives.

To evaluate the state of infrastructure analysis and its ability to contribute to the QDR, we need some sense of what the QDR will review. This is because models and data may be good enough to address some issues but be inadequate for other issues.



Potential QDR Areas That May Need Analytical Support (1 of 2)

- Consolidation
 - Installation, organizational, geographical
- Privatization
- Compensation and benefits
 - Build on QRMC work
 - Retirement, in-kind benefits
- Reengineering business processes
- Supply chain management
- Examination of oversight
 - How much, where
- Infrastructure protection

This list is merely an educated guess. But, to discuss an agenda for analysis and modeling, it has to be in the context of what the questions are. Several of these areas have been addressed before.

The value of additional consolidation of facilities and organizations needs to be further examined. The merits of additional privatization and best practices remain potential key areas for the QDR.

With potential manning shortfalls, compensation and benefits could be a major focus area. Although not immediately obvious, compensation policy is closely linked to infrastructure costs. Recruiting, retention, choices of career paths, family decisions and retirement will impact the costs and productivity of our personnel. There are many fringe benefits and delayed compensation, and there is an issue as to whether personnel view the in-kind and delayed benefits as having full value. That is, do service members see a billion dollars of in-kind benefits as being equal (or greater) than a billion dollars in pay?

The QDR may also want to look at the need for introducing greater flexibility to the compensation structure. By flexibility, we mean the ability to target pay and benefits to occupations and billets that are unattractive and difficult to fill.



Potential QDR Areas That May Need Analytical Support (2 of 2)

- Consolidation
 - Installation, organizational, geographical
- Privatization
- Compensation and benefits
 - Build on QRMC work
 - Retirement, in-kind benefits
- Reengineering business processes
- Supply chain management
- Examination of oversight
 - How much, where
- Infrastructure protection

There are many efforts to improve internal business practices and management of resources. Many of the efforts focus on technology and data integration. Yet, there are many other opportunities for reengineering the management of resources. It can be argued that the heart of business reengineering is: aligning budgets with command responsibilities, improving decision maker flexibility, aligning command and individual incentives with command missions and cost and performance visibility. The QDR could well take on these issues in its review.

Logistics support includes the full range of activities that keep the military's operational equipment working. Improving the integration of reliability improvements, supply, transportation, maintenance, test equipment and training could well be one of the QDR's focus areas.

One of the most challenging areas to evaluate is oversight. Most of OSD and much of the headquarters in the military departments and services are engaged in oversight. Yet how much is enough and the implications of more or less are never really captured in models and empirical work.

Finally, the military must worry about the vulnerability of its infrastructure to terrorism, natural disasters and catastrophic accidents. Redundancy, additional security and disruption containment could be included in the QDR's review.



Use of modeling and empirical analyses to evaluate previous initiatives

- Modeling/empirical analysis used in examining
 - Base closure
 - Competition and outsourcing
 - Inventory management
 - Some compensation policies
- Modeling/empirical analysis not used in examining
 - Organizational changes
 - Geographical consolidations
 - Some compensation policies

Analysis has supported major infrastructure decisions in DoD. For base closure, the Department of the Navy developed mathematical programming models to measure the military value associated with each set of retained bases.

Compensation and outsourcing initiatives have been backed by a large number of empirical studies. Inventory management decisions, such as readiness based sparing, draw on optimization models that have been honed over the last forty years.

In other areas, analysis has contributed little. Organizational changes and regional consolidations do not generally build on empirical analysis and the models, when used, only address the economies associated with scale. Some compensation policies, like recent changes to the retirement system, drew little on the potential of the analytical community to address the merits of the options.



Areas to improve infrastructure models (1 of 4)

- Need to link infrastructure to mission effectiveness.

As noted, analysis, modeling and empirical research has provided significant insight into ways for improving the infrastructure. On the other hand, limitations in these frameworks and models lead us to ignore or undervalue critical factors. We believe analysis can be improved in five areas.

Linking infrastructure to mission effectiveness. Infrastructure resources contribute to both present and future military capabilities. However, there are limited measures for capturing those contributions. The difficulty in constructing metrics for support organizations, in some sense, reflects the problems in defining final operational effectiveness. Most operational units are not engaged, and even when engaged, we have trouble assigning performance metrics to those units. In one sense, support organizations have a considerable advantage over operational units. Once you accept the size and configuration of operational units, keeping the equipment working and manned with trained personnel are reasonable and well-defined metrics.

Models of material management seem the best at providing the linkage. In particular, models of supply and transportation often link equipment availability to parts availability. However, linking depot maintenance, logistics headquarters, or the condition of facilities to operational equipment availability is not supported by empirical work and is rarely modeled.



Areas to Improve Infrastructure Models (2 of 4)

- Need to link infrastructure to mission effectiveness.
- Need to model organizational behavior.

Modeling organizational behavior. Models generally fail to capture the impact of infrastructure changes on a command or facility's behavior. This is because proposed changes in the infrastructure often build on structural models of organizations and facilities. For example, the consolidation of facilities and organizations usually is linked to scale economies, reduced duplication and improved interoperability. Counterproductive behavior by the organizations is seldom addressed. The fact that DoD-wide support organizations are monopolies is never considered in evaluating such a consolidation. Yet, organizations with monopoly power tend, over time, to be unaware of internal inefficiencies and become insensitive to the diverse needs of their customers. They may be less responsive to workload requirements of distant customers. Larger organizations also tend to be less flexible and responsive to changes.

Organizational responses to prices are also ignored. Large portions of the material support chain are under a reimbursable system and the effects of the prices, particularly the distorted rates we often see, are not captured. Incorrect costs could lead to the misuse of resources.

Most analyses relate surge to the size of the facility and workforce. Yet, even surge capacity is related to management and organization behavior. Surge depends on the nature of contracts with suppliers, flexibility of workload processes, and cross-training of the workforce, to cite a few factors.



Areas to Improve Infrastructure Models (3 of 4)

- Need to link infrastructure to mission effectiveness.
- Need to model organizational behavior.
- Need to model individual behavior.

Modeling individual behavior. Individual behavior must be incorporated into the analysis. Within organizations, individual incentives must be aligned with organization needs. Compensation, promotion and recognition must be linked to improvements in mission effectiveness. There is now an appreciation that the current compensation system does not properly reward innovation and efforts to use less resources for the same level of support. Models and empirical work examining these issues are rare. The few analyses that exist are of the private sector.

One area that often models and empirically estimates individual behavior is manpower compensation. Empirical work shows how enlistments and reenlistments respond to compensation. However, many military pays are driven by concern for "equity" across groups although mainstream theory tends to discount this and there seems to be no empirical basis for it.

In other areas, traditional "inequities" are accepted without any modeling or empirical justification. Examples could be differences in benefits for single and married personnel and differences between officers and enlisted. These policies for equity in some area and inequity in others could result in additional costs with little return. There has been little work in this area.



Areas to Improve Infrastructure Models (4 of 4)

- Need to link infrastructure to mission effectiveness.
- Need to model organizational behavior.
- Need to model individual behavior.
- Capturing flexibility.
- Integration/trade-offs.

Capturing flexibility. Traditional structural models evaluate infrastructure against workloads associated with scenarios. Much of the infrastructure receives funding based on structural models and then tries to maintain a level workload. Deviations in work requirements translate into either shortages or increased average costs (with costs spread over a smaller workload). Models are needed that show the value of flexible processes that can adjust to workload changes. There is a trade-off between performance in individual scenarios and ability to shift quickly across scenarios.

Integration. It is rare to find models that capture the contributions of all resources. The truth is that it is unlikely that any one model could do that. Such a model would either become too large and convoluted, or become simplistic with tendencies toward corner solutions.

Yet models that integrate both the support infrastructure and force levels are needed to evaluate the alternative ways to perform missions. Most important is the trade-off between the number of systems and the readiness of those systems.



But Analysts Can Provide Far Greater Range of Support (1 of 2)

- Examining the QDR process itself
- Developing framework for evaluating infrastructure
 - What are the right questions to ask?
 - What are the trade-offs?
 - What are the metrics?
- Empirical analysis
 - Particularly for compensation and reengineering

Analysts can contribute in many ways to the QDR. Here are some areas we discussed in our working group. The most valuable part of the QDR may be the process itself and not any formal outcomes. Although it may sound somewhat self-serving, we believe that analysts can help set up the QDR process itself. Are we getting the most out of this review and, if not, why not? Analysts can help shape the QDR decision-making process, organization and information flow.

Analysts often seek to answer the decision-maker's questions, but they can also help improve the questions that are asked. A misstated question could eliminate many good options and lead to the selection of the ineffective option.

Analysts can do more empirical work, particularly in compensation and reengineering. In compensation, for example, the merits of changing contract lengths, or possibly even eliminating contracts could be examined. In the area of reengineering, the impact of different incentives and costs can be captured from the different ways things are done across the services.



But Analysts Can Provide Far Greater Range of Support (2 of 2)

- Examining the QDR process itself
- Developing framework for evaluating infrastructure
 - What are the right questions to ask?
 - What are the trade-offs?
 - What are the metrics?
- Empirical analysis
 - Particularly for compensation and reengineering

Analysts can help by setting up better tracking systems. DoD currently initiates programs and then doesn't follow up to see if they provide the intended results and develop lessons for future programs.

Finally, in many areas, the impacts of programs are sufficiently unknown that neither empirical work nor traditional modeling can be of much help. In these cases, analysts can help develop games, simulations and experiments. Properly done, these tools can provide tremendous insight into how organizations and individuals would respond to changes. An example would be to have a game with budgets aligned a certain way, and then to run the game with a different alignment of budgets. Much could be learned by how individual behavior changes with budget alignment.



Data May Be Poor, But Need to Understand Why

- Poor definitions provide inconsistent databases.
- Disagreement on measures of effectiveness.
- Poor use of information technology.
- Time and cost to collect data.
- Poor organizational incentives.
- Organization distrust limits access.

Finally, many complain about the quality of the data. The appropriate data is not always collected. This limits the ability to manage resources to improve readiness. All would agree that data reporting can be improved and that more information could be gleaned from existing data. Yet, there are many reasons for poor data and we must be careful to identify those reasons, for we can be focusing on the wrong solutions. Here is a partial list.

Recent focus is on technology. Yet, solutions that focus on information systems will provide limited improvements if reporting organizations see no value to their effort and there is a fear that others will use it against them. Poor data are often the symptoms of deeper problems. Also, additional reporting requirements could provide little return and burden operational units.

Appendix A — Terms of Reference

Joint Analysis: QDR 2001 and Beyond Mini-Symposium and Workshop

A. BACKGROUND

The Quadrennial Defense Review (QDR)

The “Military Force Structure Review Act of 1996,” which was part of the FY 97 Defense Authorization Act, required the Department of Defense to carry out a fundamental and comprehensive examination of America’s defense needs from 1997 to 2015. This review included analysis of anticipated United States national security requirements, the defense strategy to meet these requirements, and the force structure, capabilities, and investments needed to implement this strategy. In addition, the legislation established a “National Defense Panel” to perform an independent analysis from outside DoD. The work of the NDP followed the QDR and focused on the challenges from the present to the year 2020. It assessed the implications of future threats for DoD and addressed ways DoD could better prepare for the future. The National Defense Authorization Act for FY 2000 requires that a comprehensive examination of the defense program be conducted every four years. The next review will be conducted during 2001 with the report due to Congress on September 30. There is no provision for the NDP in this legislation.

The National Security Study Group

A major new defense blue-ribbon study kicked off in October 1998 called “United States Commission on National Security/21st Century.” This panel is also known as the National Security Study Group (NSSG). It follows the basic concept formulated by Newt Gingrich and is chaired by two former senators, Gary Hart and Warren Rudman. It will operate in three phases. Phase one examined the kind of nation the U.S. will be in the early 21st century and the likely global security environment it may face. A report on this phase was submitted to the Secretary of Defense on September 15th.

The second phase will postulate the character of the U.S. through about 2030 and propose appropriate national strategies. It is scheduled to finish in April 2000. The final phase will propose changes, as needed, to the national security structure and suggest implementation procedures. The end result, an institutional roadmap, is due in February 2001.

Dynamic Commitment

During the 1997 QDR, the Joint Staff developed and led a new and innovative approach to assessing the ability of our forces to respond to various contingencies around the world — the Dynamic Commitment series of wargames. Basically, the Joint Staff, in

conjunction with the services, built about 50 "vignettes", which ranged from humanitarian assistance and disaster relief operations all the way up to major theater war. During actual game play, these vignettes were selected at random, and the services "responded" with forces that were both available and ready.

For the next QDR, the Joint Staff has already begun planning for a series of *Dynamic Commitment Beyond 2000* wargames, which will take place between June 2000 and July 2001. The objectives of this effort are to continue the work begun in the original wargame series, and improve upon it in the areas of:

- Metrics: Define measures of effectiveness that can be used to examine near-term alternative CONOPS and force structures.
- Coalition: Include the UK, and possibly other allies, in game planning and play.
- Readiness: Focus on readiness impacts of responding to contingencies, and transitioning between them.
- Computer analysis: Assess effectiveness of selective forces for each vignette in advance of game play, and improve real-time analysis during game play.

Recent MORS Activity

On 7-9 April 1998 MORS sponsored a mini-symposium titled "QDR Analysis: Lessons Learned and Future Directions" at the John Hopkins University Applied Physics Laboratory in Laurel, Maryland. The purpose of the mini-symposium was to identify actions that could be taken, and research that could be carried out over the next 2-3 years, in order to maximize the quality and the utility of the projected 2001 QDR. Lessons learned from the 1997 QDR and similar large scale planning efforts served as a starting point.

There were several talks at the June 1998 66th MORS Symposium relating to joint analysis and QDR preparation. They include

- "Making OR Relevant to 21st Century Decision Making," Lou Finch (STF Corporation)
- "Defense Program Projection (DPP) -- Robust Analysis of OSD Programming," Dr. Michael Gilmore (OD PA&E)
- "Quadrennial Defense Review Alternative Assessment," Col Forrest Crain (Center for Army Analysis)

At the 67th MORS Symposium in June 1999 there were several model-related talks that advertised improvements in the joint analysis tool set. In addition, there was a presentation by Robbin Beall and Chuck Werchado from N81 that described Navy QDR preparation in the OOTW area titled "Evaluating Force Sufficiency in Operations Other Than War."

B. PURPOSES

This mini-symposium/workshop will

- Examine DoD assessment capabilities for performing QDR 2001 (to include such activities as gaming of advanced operational concepts).
- Provide a non-confrontational environment in which OSD, the Joint Staff, Defense Agencies, Unified Commands, and the Services can discuss analytical plans and preparations for QDR 2001.
- Provide ideas and analytical status to OSD/JCS decision makers that are planning and structuring QDR 2001.
- Identify other activities that can help joint analysis in the 21st century

The following areas will be addressed:

- Analytical Subjects. It is expected that these will be derived almost entirely from DoD sources. They will be based on existing strategies, missions, operational concepts, and forces; and on suggestions concerning feasible changes required to deal with evolving security challenges of the 21st Century.
- Analytical Structure and Processes. This includes how the analysis is being structured to support the QDR and the processes that support this structure, including status and plans for "collaborative analysis."
- Analytical Tools. This is a significant focus of the workshop. It will examine the status of key tools and methodologies that support joint analysis. Identify limitations and suggest remedies/work-arounds.
- Data Collection. The role of Joint Data Support (JDS) and other sources of data. Identify limitations and suggest remedies/work-arounds.
- Analyst-Decision Maker Interactions. Carefully informing the decision maker of what to expect from analysis and educating the analysts on the needs of the decision makers.
- How the MOR Society can help.

C. ADMINISTRATIVE

Dates: Feb 1, 2, 3, 2000

Place: Booz Allen & Hamilton, Tysons Corner, VA

Classification: SECRET

There may be a limited number of first-day only participants selected. However, preference for attendance will be given to those who register for all three days. The registration fees are as follows: Mini-Symposium only (Day 1): U.S. Federal Government \$90; all others \$180. Mini-Symposium and Workshop (Days 1, 2 and 3) – U.S. Federal Government \$190; and others \$380.

D. TENTATIVE AGENDA

A three-day program is planned; a one-day Mini-Symposium and a two-day Workshop.

Section 1. (Mini-Symposium). All of the first day will be devoted to a series of speakers, who will address plenary sessions. (NOTE: The order below may be adjusted based on speaker availability.)

Call to Order

Program Chair	Mr. Mike Leonard	
MORS President	Dr. Bob Sheldon	(5 minutes)

Workshop Overview and Background

Mr. Mike Leonard	(15 minutes)
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Keynote Presentations

Moderator	Dr. David Chu, RAND	
▪ Congressional Perspective	Mr. Christopher Jehn, CBO	(30 min)
▪ Environment	Admiral Harry Train, (USN, Ret), SAIC	(30min)
▪ Baseline Strategy	Mr. Andy Hoehn, OUSD (Policy)	(30 min)
▪ Analytical Approach	Mr. Vince Roske, JS/J8	(30 min)
	Mr. Jim Johnson, OD(PA&E)	(30 min)
▪ Panel		(45 min)

Guest Presentation

Michele Flournoy	(45 min)
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Service Presentations

Moderator	General Larry Welch (USAF Retired), IDA	
Army	LTG Kevin P. Byrnes	(30 min)
Navy	VADM Conrad C. Lautenbacher, Jr.	(30 min)
Air Force	Lt Gen William J. Begert	(30 min)
Marines	LtGen John Rhodes	(30 min)
Panel		(45 min)

Analysis of SSCs and Engagements (Dynamic Commitment)	LTC Charles Bruce, JS/J8	(45 min)
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Mixer

Section 2. (Workshop). The Workshop portion is split into four working groups, with three having additional breakouts called subgroups. Some sessions will take place at the working group level and others at the subgroup level. Featured presentations will tend to be at the working group or combined working group levels. The subgroups will include both presentations and problem-solving discussions. The entire conference will meet in the late afternoon of day 3 for presentations by the working groups and a summary by the synthesis group.

The Working Groups are Integration, Shape, Respond, and Prepare.

**a. Integration: Chair: Dr. Robin Buckelew, Center for Land Warfare;
Co-Chair: Dr. Paul Davis, RAND**

This working group will focus on overall force planning concepts. It will address the analytical support that the operations research community can offer to help balance the often competing demands emanating from the Shape, Respond and Prepare activities. A special emphasis will be placed on developing integrated approaches for making difficult tradeoffs involving strategic objectives, costs, and other considerations. More specifically, an analytical understanding of the cause and effect relationships that exist between and among strategy, force structure, readiness, modernization, infrastructure, human resources, and information operations and intelligence will be the focus of this working group. We will also review and discuss conclusions and recommendations from prior studies (Defense Science Board, National Research Council, and others) regarding the nature of DoD's approach to analysis and how it might be improved in the future. Finally, the working group will explicitly discuss the special analytic problems associated with DoD's efforts to "transform the force" to exploit the revolution(s) in military affairs. This includes addressing the conceptual template for joint operations provided by JV 2010; supporting the development of future joint capabilities through studies and experiments in Joint Forces Command; and integrating allied, interagency, and industry contributions into force planning analysis.

**b. Shape: Chair: Dr. Dave Perin, CNA; Co-Chair: Dr. George Akst,
MCCDC**

According to the National Security Strategy, the U.S. military "plays an essential role in building coalitions and shaping the international security environment in ways favorable to U.S. national interests." This wording acknowledges that shaping is a broad task that involves the cooperative effort of many other U.S. and international agencies. These shaping activities include "efforts to promote regional stability, prevent or reduce conflicts and threats, and deter aggression and coercion on a day-to-day basis in many key regions of the world."

The above description leaves a lot of room for interpretation about what to include in the shaping category, and what not to include. The reference to "reducing" conflict implies that shaping can include certain levels and types of conflict. For the purposes of this workshop, we include those conflicts that either arise from an escalation of a predominantly shaping mission, or where the main goal is limited warfare to achieve a certain shaping function. What about humanitarian assistance efforts, such as disaster

relief? These can be characterized legitimately as responding, but we include them in this section because a major goal of these operations is also shaping: winning friends and influencing people around the world. This working group will focus on the two primary categories, engagement/overseas presence and small-scale contingencies and operations other than war.

Because the upcoming *Dynamic Commitment, 2001 and Beyond* wargame/exercise is designed to get at the operating tempo (OPTEMPO) and force structure implications of many of these shaping operations, as well as our ability to respond to crises. We plan to set aside a morning to discuss the tools and approaches associated with this effort. This session will be a joint session with the Respond working group, and will review and assess the many tools being developed for Dynamic Commitment.

1. Engagement/Overseas Presence. The National Security Strategy clearly articulates the "imperative of engagement," which states that the strategy of engagement will take us into the next century. The concept and strategy for overseas presence, on the other hand, is not nearly so well articulated. The objective of an engagement strategy is to provide proactive leadership in world affairs to influence the actions of other states and non-state actors. The concept of engagement, and the activities it encompasses, are closely tied with the overseas presence of deployed military forces, both permanent and rotational. This can cause confusion if engagement and overseas presence are viewed as being the same, which they are not. Engagement and overseas presence operations are not conducted for precisely the same reason. The Unified Commanders have developed theater engagement plans (TEPs), under the direction of the CJCS, which articulate security challenges and engagement goals for their areas of responsibility. Included in the plans are activity annexes that describe the resources (in most cases represented by forces necessary in theater) that are required to execute the plan. Because the TEP process is immature, the Joint Staff (J-5) is conducting an assessment of our worldwide engagement activities to help guide future TEP development. This assessment has identified several areas in which the operations research community might help, including the development of activity-to-objective linkage methodologies and cost-benefit analysis. Further, understanding the relationship between the larger objectives of overseas presence and those of engagement will be critical to the future employment of our engagement strategy. This subgroup will focus on methodologies for assessing engagement and overseas presence, and on the integration of engagement and overseas presence.

(Chair: Mr. Dean Free, N81; Co-Chair: CAPT (Sel) Spencer Tolis, N81)

2. Small-Scale Contingencies and OOTW. These types of operations include such efforts as: reducing the production and flow of illegal drugs into the U.S. by military support to joint interagency task forces; providing humanitarian assistance operations, such as earthquake and famine relief; and bolstering regional stability. This session will examine existing and new frameworks for assessing the effectiveness of such operations, to include special information and data needs, possible MOEs, and models and simulations. **(Chair: COL Forrest Crain, DMSO; Co-Chair, Dr. Dean Hartley, ORNL)**

c. Respond: Chair: COL Bob Clemence, JCS/J8

U.S. forces must be able to execute the full spectrum of military operations, from deterring adversary aggression and conducting concurrent smaller-scale contingency operations to fighting and winning major theater wars. The ability to respond will focus on four areas. First, the Combat Operations Subgroup will address the present and future states of that field, focusing on modeling to support the QDR. It will examine DoD modeling capabilities available for use in the next QDR, and suggest near-term investment options to enhance those capabilities. Second, the Information Operations Subgroup will identify opportunities that exploit U.S. information dominance, as well as the risks. It will simultaneously identify concepts, models, and measures-of-merit needed to support the acquisition and use of information warfare capabilities. Third, the Asymmetric Challenges Subgroup will examine the threat or use of weapons of mass destruction (WMD) in an asymmetric fashion. The United States must anticipate and confront such threats with a range of actions potentially including declaratory policy, operational concepts for frustrating such attacks, and changes in force posture that would both reduce U.S. vulnerabilities and render such policies and concepts more effective. This work group will focus on the emerging contribution of operations research to these challenges. The fourth group will address readiness with a concentration on the CINC's perspective. It will also examine the impact of the recent increases in operations tempo on force readiness.

1. Combat Operations. This group will focus on the DoD's ability to analyze combat operations, especially in a 2-MTW context. This subgroup will examine the present and future state of campaign modeling. It will explore the value of JWARS to QDR 2001 along with alternatives. The final product will include an estimate of the likely DoD modeling capabilities available for use in the 2001 QDR, and options for near-term investment to enhance these capabilities. (**Chair: COL Andy Loerch, CAA; Co-Chair: Col Rich Hanley, AFSAA**)

2. Information Operations. For the foreseeable future, the U.S. will not only be more capable than any possible adversary in the technical use of information to support warfare, but will also be more dependent on its successful use. This creates both opportunities and risks—opportunities to exploit information superiority (or even information dominance) in the battlespace, but risks that attacking information systems may prove to be much cheaper and easier than building and using them. This subgroup will identify concepts, models and measures-of-merit needed to support the acquisition and use of information warfare capabilities. (**Chair: Mr. Steve Myers, JHU/APL; Co-Chair: Dr. Bill Kemple, NPS**)

3. Asymmetric Challenges. While U.S. military forces appear dominant across a range of potential conflicts, serious threats to these forces and U.S. national security have not disappeared. They now will likely take the form of asymmetric challenges that would attack the vulnerabilities of U.S. forces, the forces of U.S. allies, and to the United States and its allies more generally. Asymmetric threats could come in various forms, including weapons of mass destruction (WMD), theater missiles, special forces, terrorism, deep sea mines, diesel submarines, and information warfare. These threats are particularly dangerous if they are not recognized and prepared for. This subgroup will explore how

these threats affect U.S. strategy and force requirements (especially relating to “full-dimensional protection” and the “shape” strategy element). It will identify alternative strategies and operational concepts that respond to such threats together with the U.S. force structures/postures that would make these responses more effective.

(Chair: LTC Jerry Glasow, DUSA(OR))

4. Readiness. This subgroup will address readiness issues to include how to measure it, cost it, and how much is enough. One of the current problems for the CINC's is assessing the readiness at their level. How does one assess the readiness of a Joint Task Force (JTF)? We are no longer determining whether a unit is ready to do the job it was designed to do – but rather whether the CINC has the necessary assets to accomplish his Unified Joint Task List (UJTL). This is a crossover issue between force structure and readiness. A related readiness problem, increased operating tempo, is manifested differently across the Services, and is impacting different types of units within Services differently. Some specific units are being overburdened to the point of impacting Quality of Life and ultimately personnel readiness. Personnel (to include both quantitative and qualitative dimensions) is a basic readiness driver. Another important issue (particularly in naval aviation) is the impact of “new” business practices on stockage-levels and the procurement of spare parts. The impact of new concepts such as distributed mission training and joint experimentation will also be addressed. (Chair: Mr. Fred Hartman, IDA: Co-Chair: Dr. Laura Junor, CNA)

d. Prepare: Chair: Dr. Jackie Henningsen, AF/XOC, Co-Chair: Mr. Vern Bettencourt, HQDA, DCSOPS

Beyond seeking forces robust enough to *respond* to a daunting menu of challenging scenarios and to support our efforts to *shape* our security environment to best meet national needs, we must *prepare* ourselves for an uncertain future going out well beyond a usual programming horizon of a half a dozen years. This is sometimes termed **strategic adaptiveness**. It may start with conventional studies of how we change our present forces of divisions, carrier groups, wings, etc. via modernization (improvements in weapon systems), sizing changes, and new operational concepts, but much more is involved. We should include the possibility of drastic changes in the way we fight and/or in the way we organize our forces in order to exploit technological opportunities, cope with geopolitical changes and shifts in alliances, adapt to economic and social fluctuations, etc.

For purposes of this workshop, we have divided the discussion of preparing into the two subgroups described below:

1. Force Modernization. This subgroup will focus on analyses that support force modernization. It will address ways that analysis may help in the modernization versus force size decision and in determining the effectiveness of new operational concepts. It will also address the challenge of drawing lessons from the “experiments” the Services and Joint Staff are conducting. (Chair: Mr. Eric Coulter, OSD/PA&E; Co-Chair: Dr. George Koleszar, IDA)

2. Infrastructure. The support infrastructure must be capable of supporting the full range of potential operations and it must provide that support as efficiently as possible.

Most initiatives seek to reduce costs, but any change must also provide the necessary readiness and responsiveness. This session will examine issues in several areas where changes have been proposed: consolidation, alternative ways to provide support, manpower management, and resource management. In particular, we will examine the merits of three types of consolidation: organizational, budgetary, and physical. In the support area we will review the relative values of using military personnel, civil servants, and commercial contractors in providing support services away from the front line. It has been argued that both military personnel and civil service systems tend to limit our making the best use of the people in DoD. We will examine compensation policies and assignment policies and how these policies shape the workforce we have. Several recent resource management initiatives include cost visibility, greater budget flexibility for command and field activities, and incentives that reward good resource management. In all areas, we will have presentations on the issues, review any theoretical or empirical work, and discuss the available models. More importantly, we will examine the constraints to making changes in these areas. We will discuss the concerns of the individual military services and how best to address those concerns. **(Chair: Dr. Sam Kleinman, CNA; Co-Chair: Dr. Frank Camm, RAND)**

Working Group Guidance

Each of the working groups will address the following:

- From the list of analytical subjects, identify those in your domain. They may be expanded to achieve the needed level of detail.
- Identify potential QDR analysis relationships and measures in your area
- Identify available tools and assess their capability to address each of the potential analytical subjects
- Identify sources of data – propose new sources
- Suggest future courses of action to improve the usefulness of QDR 2001
- Suggest ways to improve joint analysis in the 21st century.

It is anticipated that the break-out sessions will include a few papers together with a significant amount of time allocated to discussion. The discussion will focus on recommendations for the future. The above guidance is not rigid or all inclusive. Working groups and subgroups are encouraged to explore any topic that may provide valuable analytical insights relative to the next QDR.

There will be a briefing on facilitation skills for working group and subgroup chairs prior to the start of the mini symposium. (Tentative: Hank Dubin)

Component Coordinators

Each Service, OSD, and the JCS will be given the opportunity to provide a coordinator for each subgroup and the Integration Working Group. The coordinator would, at a minimum, solicit appropriate subgroup membership from their component. In addition, they may be asked to provide a short presentation on their component's perspective and participate in the pre-workshop planning for the group.

Plenary Sessions on days 2-3

- Models, Data and Analysis (Day 2, 0800 – 0900)
 - JWARS Overview
 - JDS Overview
 - Comments From a Case Study on Collaborative Analysis
- DARPA Future Technologies (Day 3, 1300 – 1415)
 - Tactical Technology Office
 - Air, Space and Land Platforms
 - Future Army System
 - Precision Attack
 - Special Projects Office
 - Chem-Bio Defense Systems
 - Attack of Mobile Targets
 - Counter-Underground Facilities

Synthesis Group (Chair: Dr. Stuart Starr, FS, Mitre; Co-Chair: Dr. Cy Staniec, Logicon)

The final session at the workshop will include a presentation by this group that summarizes and integrates the topics discussed in the working group.

Workshop Products

- Executive Summary and briefing for sponsors (due 10 March 2000)
- *PHALANX* article (due 1 April 2000)
- Briefing at 68th MORSS (due June 2000)
- Report to MORS Office (due 1 May 2000)

Note: There will be a meeting of the working group and subgroup leaders early the week of 7 February to facilitate the preparation of these products.

Read Ahead

1. 1997 National Defense Panel Report
2. 1997 QDR report
3. 1999 Congressional Language
4. NSSG Phase I Report

Appendix B — Plenary Speaker Biographies
Joint Analysis: QDR 2001 and Beyond
Mini-Symposium and Workshop

Amy E. Alving, Deputy Director
Special Projects Office (SPO)

Dr. Alving is the Deputy Director and Chief Scientist of the Special Projects Office. In this capacity, she assists the Director, SPO, in the monitoring, analysis, and evaluation of research projects directed by the SPO Program Managers. In addition, she is responsible for the conceptual planning necessary to lead SPO into new program areas far in advance of the current state-of-the-art.

Her technical background is in the area of experimental fluid mechanics, especially in turbulent and transitional flows. Areas of interest include transport phenomena; separating flows; film flows; drag reduction; stochastic processes; signal and image processing. Prior to coming to DARPA in November, 1998, she served for three years on the Army Science Board, participating in studies on Unmanned Aerial Vehicles; Battlefield Visualization; and the Crusader Liquid Propellant Gun. In addition, she reviewed studies on Army Beyond 2010; Prioritizing Army Space Needs; and Distance Learning.

Dr. Alving is on leave from the University of Minnesota, where she is a tenured professor in the Department of Aerospace Engineering & Mechanics. In 1997, she was appointed by the President to a one-year position as a White House Fellow, serving as Special Assistant to the Deputy Secretary of Commerce. She worked in a number of technical areas including space commercialization; critical infrastructure protection; the Partnership for a New Generation of Vehicles; and the Advanced Technology Program. She is a member of the board of directors of the Hertz Foundation and is an associate editor of the *International Journal of Experimental and Thermal Fluid Science*. She received her Ph.D. in Mechanical and Aerospace Engineering from Princeton University and her B.S. in Mechanical Engineering from Stanford University.

**David S.C. Chu, Vice President Army Research Division
RAND**

Mr. Chu is currently the Vice President responsible for RAND's Army Research Division and Director of the Arroyo Center. Previously, he was Director of RAND's Washington Office and Associate Chairman of RAND's Research Staff.

Mr. Chu served in the Department of Defense as Assistant Secretary and Director for Program Analysis and Evaluation (1981-1993). Earlier, Mr. Chu was the Assistant Director of the Congressional Budget Office for National Security and International Affairs (1978-1981).

Mr. Chu was an economist with RAND from 1970 to 1978, and served in the U.S. Army from 1968-1970.

Mr. Chu was educated at Yale University, receiving his BA in Economics and Mathematics, and his Ph.D. in Economics. He has been awarded the Department of Defense Medal for Distinguished Public Service with Silver Palm and the National Public Service Award of the National Academy of Public Administration, of which he is a Fellow, and on whose Board he serves as Treasurer.

**Christopher Jehn, Assistant Director
for National Security of the US Congressional Budget Office**

Christopher Jehn is Assistant Director for National Security of the U.S. Congressional Budget Office, responsible for directing CBO's National Security Division. He has been an executive with the Center for Naval Analyses, the Institute for Defense Analyses, and ICF Kaiser International, Inc. During the Bush Administration he served as the Assistant Secretary of Defense for Force Management and Personnel.

An economist, Mr. Jehn was educated at Beloit College and the University of Chicago. At the Center for Naval Analyses, he directed projects analyzing manpower and personnel policies, logistics practices, and budget and procurement policy for the Navy. Before he joined the Bush Administration in 1989, he was Vice President and Director of the Marine Corps Operations Analysis Group at CNA, responsible for all CNA's workXweapon systems assessments, human resources analyses, program evaluations, and operational and tactical analysesXfor the U.S. Marine Corps.

As Assistant Secretary of Defense (FM&P), Mr. Jehn was the senior human resources executive in the Defense Department, responsible for policy and oversight of the recruiting, training, compensation, support, and management of the then more than three million military and civilian personnel in the Department. He planned the substantial downsizing of the Defense Department and managed its initial implementation. The plans and special tools developed under his direction are still being used by the Clinton Administration to achieve further reductions in the Defense Department.

Mr. Jehn was named Senior Fellow at the Institute for Defense Analyses in 1993 and was Director of IDA's Strategy, Forces, and Resources Division when he left to join ICF Kaiser in 1995. His responsibilities there included leading ICF Kaiser's benchmarking and human resources management consulting practices. As an independent consultant, in 1995 Mr. Jehn led an intelligence community task force that developed a framework for sweeping reform of the personnel systems for the U.S. government's civilian intelligence professionals; and he organized and led a team of consultants that successfully defended the Great Lakes Naval Training Center before the 1993 Base Closure and Realignment Commission. In 1997 he served as the Executive Director of the National Defense Panel and, through 1998, as a member of the Commission on Servicemembers and Veterans Transition Assistance. He joined the Congressional Budget Office in 1998 as its Assistant Director for National Security.

Mr. Jehn, a National Merit Scholar, was a University Fellow at the University of Chicago. Among his other awards and honors are the Benjamin Hooks Distinguished Service Award from the NAACP, the Distinguished Public Service Medal from the Department of Defense, and the Meritorious Police Cross from the government of Spain. He was appointed to the Commission on Servicemembers and Veterans Transition Assistance by the Senate Armed Services Committee.

James J. Metzger

Jim Metzger received a Ph.D. in mathematics from the University of Michigan in 1970. He has been an operations research analyst for 25 years, initially for the Department of the Army and later for the Office of the Secretary of Defense (OSD). Since November 1995 he has been Director of the Joint Warfare System (JWARS) Office which reports to the Director, Program Analysis and Evaluation, OSD.

Elaine Simmons

Elaine Simmons received her MA in Defense Policy Analysis from The George Washington University in 1984. She was an Operations Director for GRCI International before joining Program Analysis and Evaluation in OSD. Ms Simmons has directed the Joint Data Support (JDS) organization since 1997.

Admiral Harry D. Train II
Retired Admiral and former Supreme Allied Commander Atlantic

US Commision on National Security — COMMISSIONER

EDUCATION

Bachelor of Science, United States Naval Academy
Additional course work completed at Submarine
School New London and US Naval Postgraduate School

PROFESSIONAL EXPERIENCE - HIGHLIGHTS

Commander-in-Chief, United States Atlantic
Command/ NATO Supreme Allied Commander, Atlantic
Commander, United States SIXTH Fleet
Director of Joint Staff
Senior Fellow, CAPSTONE Flag & General Officers Course, National Defense University
Senior Fellow, Joint & Combined Warfighting School, Armed Forces Staff College
Member of Defense Science Board Task Force on Information Warfare Defense
Mentor, Defense Science Studies Group
Professor of Military Professionalism in the Henry Clay Hofheimer Chair of Military
Professionalism, Armed Forces Staff College
Board Affiliation: Aydin Corporation, Institute for Defense Analyses, American Cancer Society,
Future of Hampton Roads, and Chairman of the Board of Governors of Town Point Club

AWARDS

US Defense Distinguished Service Medal
US Navy Distinguished Service Medal (with Three Gold Stars)
US Navy Legion of Merit (with Three Gold Stars)
US Navy Meritorious Service Medal
US Joint Services Commendation Medal (with Oak Leaf Cluster)

General Larry D. Welch, USAF (Retired)

Education:

B.S. - Business Administration - University of Maryland
M.S. - International Relations - George Washington University
Armed Forces Staff College (Intermediate Professional Education)
National War College (Senior Professional Education)
Harvard National Security Seminar (Graduate Seminar)

Professional Experience: President and Chief Executive Officer of The Institute for Defense Analyses (IDA) in Washington D.C. -- a federally chartered research center providing operations and technical analysis, and management and information systems design and development for the Department of Defense and other U.S. government agencies.

Chief of Staff, United States Air Force 1986-1990: Senior uniformed officer responsible for organizing, equipping, and executive direction. Member of the Joint Chiefs of Staff, serving with the Chairman and other service chiefs as military advisors to the Secretary of Defense and the President on National Security Matters.

Commander in Chief, Strategic Air Command 1985-1986: Joint Specified Command responsible for operational planning for all U.S. strategic nuclear systems. Air Force field command responsible for the operational readiness of the bomber and ICBM legs of the strategic nuclear deterrent.

Vice Chief of Staff, U.S. Air Force 1984-1985: Responsible for the day to day work of the Headquarters, USAF staff and coordination with other services and other government agencies.

Deputy Chief of Staff, Programs & Resources, Hq. USAF 1982-1984: Responsible for formulating program proposals; long range programming; and manpower and organization. Also responsible for programs for sales of military equipment, and associated training and logistics support plans to foreign nations.

Commander, Air Force Central Command and 9th Air Force 1981-1982: Responsible for the daily command and management of USAF tactical forces in the eastern half of the U.S. Also serves as air component commander to the United States Central Command.

Headquarters Tactical Air Command 1977-1981: Served successively as inspector general, deputy chief of staff (DCS) for plans and deputy chief of staff for operations.

Tactical Fighter Wing Commander 1974-1976: Commanded the first operational F-15 Wing.

Professional Associations and Activities: Aerospace Education Foundation, Director; Air Force Academy Foundation, Director; Atlantic Council, Councilor; Boy Scouts of America, National Capitol Area Council Executive Board, Member; Commission on Maintaining US Nuclear Weapons Expertise, Member; Commission to Assess the Ballistic Missile Threat to the United States, Member; Council on Foreign Relations, Member; Defense Intelligence Agency Science and Technology Advisory Board, Member; Defense Science Board, Member; Henry L. Stimson Center, Board of Directors; Institute for Defense Analyses, Board of Trustees; Joint Committee on Nuclear Weapons Surety (DOD/DOE), Chairman; Joint Security Commission, Chairman; Lawrence Livermore National Laboratory National Security Advisory Committee; National Eagle Scout Association, Member; President's Security Policy Advisory Board, Chairman; Threat Reduction Advisory Committee, Chairman; U.S. Strategic Command Strategic Advisory Group, Member.

Dr. David Whelan

Dr. David Whelan was appointed as Director of the Tactical Technology Office (TTO) of the Defense Advanced Research Projects Agency (DARPA) in 1996. TTO is chartered to develop advanced military technology across a broad range of aerospace, land, and embedded processor and control system applications. As the director, Dr. Whelan is responsible for both the technical and financial aspects of TTO. Prior to joining TTO, Dr. Whelan served one year as Deputy Director then as Acting Director of DARPA's Sensor Technology Office, which develops advanced surveillance radars, fire control radars, and missile seeker technology for air defense systems. Several key projects conceptualized and developed under his administration include:

- Discoverer II, a constellation of space-based, tactical, GMTI/SAR radar platforms providing high revisit imagery, precision targeting, and continuous high resolution-ground moving target imaging (HR-GMTI),
- Unmanned Combat Air Vehicles (UCAV), a lethal air vehicle designed to provide persistent suppression of enemy air defenses and deep strike capability,
- Arsenal Ship, a very low manned land-attack cruiser providing 512 vertical launched weapons in a very low signature design.

Dr. Whelan started his professional career with Northrop Corporation in 1983 where he led the effort to design, develop and test the B-2's low-observable propulsion system and propulsion-airframe integration. While at Northrop he pioneered the development and use of inverse synthetic aperture radar as a low-radar-cross-section diagnostic tool for the development of the B-2 and YF-23 aircraft programs.

In 1985 Dr. Whelan joined the Lawrence Livermore National Laboratory (LLNL) as a research physicist and member of a team developing soft-x-ray lasers. He worked at LLNL for three years designing and managing experiments on advanced nuclear weapons with emphasis on high-bandwidth, high-sensitivity, x-ray detectors and spectrometers used to characterize laser sources. He co-authored several papers on soft x-ray lasers and their characteristics.

In 1988 Dr. Whelan joined the Radar Systems Group at Hughes Aircraft where he was Program Manager and Chief Scientist for the B-2 Bomber Air-to-Air Radar Imaging Program. In this role he made significant contributions to stealth diagnostic technology by developing airborne radar testbed of air-to-air imaging in the VHF, S, X, and Ku bands. Additionally, he served as Lead Low Observables Scientist on the engineering team developing the Low Observable Active Array Radar System designs for fighter aircraft.

While at Hughes, Dr. Whelan started a successful scientific instrument company, Current Research. The principal products of this company were state-of-the art, high-speed X-Ray Framing Instruments, and some of the world's fastest high-voltage short-pulse generators.

Dr. Whelan returned to LLNL in 1994 and worked on the Director's staff at the Lasers Division, where he became technical advisor to DARPA STO on advanced air vehicles and radar-system technologies. During this period he also investigated radar imaging of ocean-surface scattering for non-acoustic ASW and he worked on an initiative to develop adaptive-optical compensation of atmospheric refraction for large, terrestrial observatories.

Dr. Whelan earned his Ph.D. in Physics from the University of California at Los Angeles in 1983 and his Master's of Science degree in Physics in 1978. He received his B.A. degree in 1977 from the University of California at San Diego. He has numerous publications on electromagnetic radiation and laser

phenomena and holds several patents on antenna and low-observable technology. He is a member of the American Physical Society, the IEEE, and the AIAA.

Dr. Whelan was honored in 1998 as the recipient of the Secretary of Defense Medal for Outstanding Public Service for his innovation, design and development of space-based surveillance and unmanned stealth combat aircraft. He has also received various other awards from Hughes Aircraft and Northrop-Grumman.

Appendix C — Acronyms **Joint Analysis: QDR 2001 and Beyond** **Mini-Symposium and Workshop**

A&T	Acquisition and Technology
AAA	Anti Aircraft Artillery
AAW	Anti Air Warfare
AC	Active Component
AC/RC	Active Component/Reserve Component
ACC	Army Component Commands
ACSIM	Assistant Chief of Staff for Installation Management (Army)
ACT	Analysis of Complex Threats
ACTD	Advanced Concept Technology Demonstration
ADRS	ARNG Division Redesign Study
AEF	Air Expeditionary Force
AEW	Air Expeditionary Wing
AF	Air Force
AFIS	Armed Forces Information Service
AFR	Air Force Reserve
AFSAA	Air Force Studies and Analyses Agency
AGATE	A Global Assessment Tool for Engagement
ALADUN	Africa and Latin America Database
AMC	Air Mobility Command
ANG	Air National Guard
AO	Area of Operations
AOA	Analysis of Alternatives
AOR	Area of Operational Responsibility
AQ	Acquisition (Air Force)
ARNG	Army National Guard
ARSTAF	Army Staff
ASARS	Advanced Synthetic-Aperture Radar System
ASPG	Army Strategic Planning Guidance
ASUW	Antisurface Warfare
ASW	Antisubmarine Warfare
ATF	Department of Alcohol, Tobacco and Firearms
ATP	Anti-Terrorism Planner
AVI	Assessing Vulnerability to Instability
AWACS	Airborne Warning and Control System
AWE	Advanced Warfighting Experiment
AWOS	Air War Over Serbia
BAH	Booz Allen & Hamilton
BDE	Brigade
BDI	Bomb Damage Indication
BMDO	Ballistic Missile Defense Organization
BRAC	Base Realignment and Closure
BUR	Bottom Up Review
BW	Biological Warfare

C1	Resourced and trained for full wartime mission; highest state of readiness in SORTS
C2	Command and Control
C3	Command, Control, Communication
C4	Command Control, Communication, Computers
C4ISR	Command Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance
CA	Civil Affairs
CAA	Center for Army Analysis
CALCM	Conventional Air Launched Cruise Missile
CAOC	Combined Air Operations Center
CAPS	Contingency Analysis and Planning System
CASREPS	Casualty Reports
CATS	Consequence Assessment Tool Set
CBMR	Capabilities Based Munitions Review
CBO	Congressional Budget Office
CBT	Combat
CBW	Chemical and Biological Warfare
CEM	Concepts Evaluation Model
CENTCOM	Central Command
CG	Commanding General
CINC	Commander in Chief
CJCS	Chairman of the Joint Chiefs of Staff
CMAC	Counternarcotics Modeling and Analysis Capability
CMMS	Conceptual Models of the Mission Space
CNA	Center for Naval Analyses
COA	Course of Action
COMSEC	Communications Security
CONOPS	Concept of Operations
CONUS	Continental United States
COSAGE	Combat Sample Generator
COST	Contingency Operations Support Tool
COTS	Commercial Off the Shelf
CPA	Chairman's Program Assessment
CPAM	CNA Program Analysis Memorandum
CPR	Chairman's Program Review
CS/CSS	Combat Support/Combat Service Support
CSA	Chief of Staff Army
CVA	Air Force Assistant Vice Chief of Staff
CVBG	Carrier Battle Group
CW	Chemical Warfare
DARPA	Defense Advanced Research Projects Agency
DAS	Deep Attack Study
DASD	Deputy Assistant Secretary of Defense
DAWMS	Deep Attack Weapons Mix Study
DC	Dynamic Commitment
DCAA	Defense Contract Audit Agency
DCB2K	Dynamic Commitment Beyond Year 2000

DCINC	Deputy Commander in Chief
DeCA	Defense Commissary Agency
DEXES/CAM	Deployable Exercise System/Civil Affairs Module
DFAS	Defense Finance and Accounting Service
DIA	Defense Intelligence Agency
DIRMOBFOR	Director Mobility Forces
DISA	Defense Information System Agency
DIV	Division
DLA	Defense Logistics Agency
DLSA	Defense Legal Services Agency
DMSO	Defense Modeling and Simulation Office
DoD	Department of Defense
DoD EA	DoD Education Activity
DoD HRA	DoD Human Resources
DP	Personnel (Air Force)
DPFX	Plans and Requirements Division (Air Force Personnel)
DPG	Defense Planning Guidance
DPP	Defense Program Projection
DSB	Defense Service Board
DSCA	Defense Contract Audit Agency
DSS	Defense Supply Services
DTIC	Defense Technical Information Center
DTRA	Defense Threat Reduction Agency
DUG	Deep Underground
DUSA	Deputy Under Secretary of the Army
EADSIM	Extended Air Defense Simulation
EEA	Essential Elements of Analysis
ELIST	Enhanced Logistics Intratheater Support Tool
ERID	External Review Integration Division
EUCOM	European Command
EW	Early Warning
EXCOM	Executive Committee
FA&CT	Force Allocation and Capabilities Tool
FACT	Force Allocation Comparison Tool
FALCON	Force Allocation and Contingencies
FBI	Federal Bureau of Investigation
FDP KAT	Formalized Data Products Knowledge Acquisition Tool
FEF	Federal Executive Fellow
FEMA	Federal Emergency Management Agency
FFRDC	Federally Funded Research Development Center
FID	Foreign Internal Defense
FMC	Fully Mission Capable
FORSAT	Force Structure Analysis Tool
FS	Force Structure or Fellow, Military Operations Research Society
FSA	Full Spectrum Analysis
FYDP	Five Year Defense Program
GCAM	General Campaign Analyses Model
GDIN	Global Disaster Information Network

GEDS	Global Events Data System
GEOWARN	Global Emergency Warning and Relief Network
GMU	George Mason University
GOSC	General Officer Steering Group
GPS	Global Positioning System
GSORTS	Global Status of Resources and Training Systems
HA	Humanitarian Assistance
HART	Humanitarian Assistance Requirements Tool
HD/LD	High Demand/Low Density
HEWS	Humanitarian Early Warning System
HNS	Host Nation Support
HQ	Headquarters
HUMINT	Human Intelligence
I&W	Indications and Warning
IA	Information Assurance
IADS	Integrated Air Defense System
IDA	Institute for Defense Analyses
IL	Logistics (Air Force)
ILX	Directorate, Plans and Integration (Air Force Logistics)
IMMACCS	Integrated Marine Multi-Agent Command and Control System
INFOSEC	Information Security
INSS	Institute for National Strategic Studies
IO	Information Operations or International Organizations
IPR	In Process Review
IPS	Illustrative Planning Scenario
IS	Information Security
ISIS	Information Superiority Investment Strategy
ISR	Intelligence, Surveillance and Reconnaissance
ISRSIM	ISR Simulation
ITEM	Integrated Theater Engagement Model
IW	Information Warfare
IWAR	Integrated Warfare Architecture
J-8	Director for Force Structure, Resource and Assessment, Joint Staff
JAMIP	Joint Analysis Model Improvement Program
JAWG	Joint Analytic Working Group
JCA	Joint Collaborative Analysis
JCS	Joint Chiefs of Staff
JD	Julian Date
JDAM	Joint Direct Attack Munitions
JDS	Joint Data Support
JEB	Joint Electronic Battlebook
JFAST	Joint Flow and Analysis System for Transportation
JFCOM	Joint Forces Command
JHU/APL	Johns Hopkins University/Applied Physics Lab
JICM	Joint Integrated Contingency Model
JIOC	Joint Information Operations Center
JMASS	Joint Modeling and Simulation System
JMRR	Joint Monthly Readiness Review

JROC	Joint Requirements Oversight Committee
JS	Joint Staff
JSF	Joint Strike Fighter
JSIMS	Joint Simulations Systems
JSR	Joint Strategy Review
JST	JWARS Study Team
JSTARS	Joint Surveillance Target Attack Radar System
JTF	Joint Task Force
JV	Joint Vision
JVAC	Joint Virtual Analysis Center
JWAC	Joint Warfare Analysis Center
JWAG	Joint Analytic Working Group
JWARS	Joint Warfighting System
JWC	Joint Warfare Center
JWCA	Joint Warfare Capabilities Assessment
KEDS	Kansas Events Data System
KFOR	Korean Forces
KPP	Performance Parameters
LAD	Latest Arrival Date
LD/HD	Low Density/High Demand
LIC	Low Intensity Conflict
LMSR	Large, Medium Speed Roll-on/Roll-off (Sea Mobility Platform)
LOG	Logistics
LP	Linear Program
M&S	Modeling and Simulation
MAJCOM	Major Command
MANPAD	Man Portable Air Defense
MC	Mission Capable
MCCDC	Marine Corps Combat Development Command
MCFADS	Marine Corps Force Allocation and Deployment System
MEF	Marine Expeditionary Force
MIW/MCM	Mine Warfare/Mine Countermeasures
MOE	Measures of Effectiveness
MOFE	Measure of Force Effectiveness
MOFP	Measure of Force Performance
MOM	Measures of Merit
MOOTW	Military Operations Other Than War
MOP	Measure of Performance
MOPE	Measure of Policy Effectiveness
MORS	Military Operations Research Society
MOSP	Measure of System Performance
MPF (F)	Mission Planning Forecast OR Maritime Prepositioning Force
MRM	Mission Requirements Module
MRS-05	Mobility Requirements Study 2005
MRS-BURU	Mobility Requirements Study/Bottom Up Review Updated
MSIAC	Modeling and Simulation Information Analysis Center
MTOF	Mission Task Organized Forces
MTW	Major Theater of War

N81	Assessment Division, Office Chief of Naval Operations
NATO	North Atlantic Treaty Organization
NBC	Nuclear, Biological, Chemical
NCA	National Command Authority
NDP	National Defense Panel
NDU	National Defense University
NEO	Non-combatant Evacuation Operation
NGO	Non Governmental Organization
NIMA	National Imagery Management Agency
NMD	National Missile Defense
NMS	National Military Strategy
NORAD	North American Aerospace Defense Command
NPGS	Naval Postgraduate School
NRO	National Reconnaissance Organization
NSA	National Security Agency
NSS	National Security Strategy
NSSG	National Security Study Group
NWC	National War College
O&M	Operations and Maintenance
OEO	Other Expeditionary Operations
OOTW	Operations Other Than War
OPLAN	Operations Plan
OPNAV	Chief of Naval Operations
OPS	Operations
OPSEC	Operational Security
OPTEMPO	Operational Tempo
OR	Operations Research
ORNL	Oak Ridge National Laboratory
OSD	Office Secretary of Defense
OUSDP	Office of the Under Secretary of Defense Policy
PA&E	Program Analysis and Evaluation (Directorate)
PANDA	Protocol for Assessing Nonviolent Direct Action
PAO	Primary Action Officer
PAX	Passengers
PCS	Permanent Change of Station
PERICLES	Political and Economic Risk in Countries and Lands Evaluation Study
PER	Personnel
PERSTEMPO	Personnel tempo
PGM	Precision-Guided Munitions
PLA	People's Liberation Army
PMAI	Primary Military Aircraft Inventory
POE	Posture of Engagement
POM	Program Objective Memorandum
PPBS	Program Planning Budgeting System
PREPO	Prepositioned Supplies
PRO	Prioritized Regional Objective
PSYOP	Psychological Operations
PVO	Private Voluntary Organizations

QDR	Quadrennial Defense Review
QOL	Quality of Life
GRAM	Quick Response Analysis Methodology
QRRC	Quarterly Readiness Report to Congress
R&D	Research and Development
RBA	Revolution in Business Affairs
RC	Reserve Component
REP JWCA	Regional Engagement and Presence Joint Warfare Capability Assessment
RMA	Revolution in Military Affairs
ROE	Rules of Engagement
RSP	Readiness Spares Package
RSTA	Reconnaissance, Surveillance & Target Acquisition
RTIC	Real Time Information in the Cockpit
S&R	Storage & Retrieval
S&T	Scientific and Technical, and Science & Technology
S&TR	Surveillance & Tracking
SAF	Secretary of the Air Force
SAF/LL	SAF/Legislative Liaison
SAF/MI	SAF/Manpower, Reserve Affairs, Installations, and Environment
SAF/PAX	SAF/Public Affairs Planning Directorate
SAM	Surface-to-Air Missile
SAR	Synthetic Aperture Radar
SATCOM	Satellite Communications
SBIRS	Space Based Infrared System
SCN	Satellite Control Network
SEASTATE	Sea State Model
SecDef	Secretary of Defense
SENSE	Synthetic Environment for National Security Estimates
SEW	Space Electronic Warfare
SIAM	Situational Influence Assessment Module
SLEP	Service Life Extension Program
SME	Subject Matter Experts
SO/LIC	Special Operations/Low Intensity Conflict
SOA	Sustained Operations Ashore
SOCOM	Special Operations Command
SOF	Special Operations Forces
SOFAS-DCBY2K	Special Operations Force Allocation System Dynamic Commitment Beyond Year 2000
SORTS	Status of Resources and Training System
SPC	Satellite Processing Center or Signal Processing Center
SROC	Senior Readiness Oversight Council
SSC	Small Scale Contingency
SSM	Surface-to-surface Missile
STOM	Ship-to-Objective Maneuver
STRATCOM	Strategic Command
SWA	Southwest Asia
TACAIR	Tactical Air
TACON	Tactical Control

TACWAR	Tactical Warfare Model
TALCE	Tactical Airlift Control Center
TAMD	Theater Air and Missile Defense
TBD	To Be Determined
TBM	Tactical Ballistic Missile
TBMD	Tactical Ballistic Missile Defense
TEP	Theater Engagement Plan
TEPMIS	Theater Engagement Plan MIS
TFW	Tactical Fighter Wing
TMD	Theater Missile Defense
TNMCM	Total Not Mission Capable Maintenance
TNMCS	Total Not Mission Capable Spares
TOR	Terms of Reference
TOT	Time on Target
TPFDD	Time Phased Force Deployment Data
TRADOC	Training and Doctrine Command
TRANSCOM	Transportation Command
TRS-05	Tanker Requirement Study 2005
TTCP	The Technical Cooperation Program
UAV	Unmanned Aerial Vehicle
UCP	Unified Command Plan
UK	United Kingdom
UN	United Nations
UOB	Unit Order of Battle Data Access Tool
USAFE	United States Air Force Europe
USCG	United States Coast Guard
USCNS-21	US Commission on National Security in the 21st Century
USD	Under Secretary of Defense
USG	United States Government
USJFCOM	United States Joint Forces Command
USMC	United States Marine Corps
USN	United States Navy
USPACOM	United States Pacific Command
USTRANSCOM	United States Transportation Command
VCJCS	Vice Chairman of the Joint Chiefs of Staff
VIC	Virtual Information Center
VITE/VDT	Virtual Design Team
VTC	Video Teleconference
VV&A	Verification, Validation and Accreditation (model)
VV&C	Verified, Validated and Certified (data)
WHS	Washington Headquarters Service
WMD	Weapons of Mass Destruction
XO	Air & Space Operations (Air Force)
XOJ	Directorate, Joint Matters (Air Force)
XOJS	Joint Studies Division (Air Force)
XOPS	Strategy Concepts and Doctrine Division (Air Force)
XP	Plans and Programs (Air Force)
XPM	Directorate, Manpower Organization and Quality (Air Force)

XPP	Directorate of Programs (Air Force)
XPX	Strategic Planning Directorate (Air Force)
XPXQ	Quadrennial Defense Review Division (Air Force)
XPXS	Strategy and Policy Division (Air Force)

